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كلمة رئيس

كلمة نائب رئيس الجامعة

أرحب بكم وأهنتكم على إختياركم كلية الدراسات العليا للعلوم المتقدمة بجامعة بنى سويف لبدأ مرحلة الدراسات العليا والبحث العلمى. لقد تم إنشاء كلية الدراسات العليا للعلوم المتقدمة (وهى الكلية الأولى من نوعها فى مصر والشرق الأوسط وشمال أفريقيا) فى أربعة مجالات أساسية، وهى تكنولوجيا النانو، والتكنولوجيا الحيوية، والطاقة الجديدة والمتجددة، والبيئة والتنمية الصناعية، وهذه هى المواضيع التى تحتل أهمية قصوى على مستوى العالم.



وقد أدخلنا فى تقييم الأبحاث نظماً جديدة من خلال تقييم الأبحاث بالخارج وقد أنتجنا ٧٠ بحثاً فى تخصصات مختلفة وتقدمنا للحصول على ١٠ براءات اختراع. كما سعينا من خلال الكلية إلى تعزيز التعاون بين العلماء ذوى التخصصات المختلفة محلياً و دولياً مما يسهم فى الوصول لنتائج بحثية غير مسبوقة.

وبالتالى، تصبح الكلية بيئة فريدة خصبة لإنتاج باحثين على مستوى عالى من الكفاءة والتميز، حيث أنها توفر أحدث الأجهزة المعملية التى تساعد الباحث فى القيام بأبحاثه العلمية. بالإضافة إلى ذلك، أن الكلية تضم فريق عمل من أكفأ أعضاء هيئة التدريس والذين قد تلقوا تعليمهم فى جامعات كبرى خارج مصر، وهم مستعدون لنقل علمهم وخبراتهم لأبنائنا الباحثين فى الداخل حتى يعود النفع على المجتمع وعلى وطننا العالى مصر.

أستاذ دكتور/ محمد محمود خضر

نائب رئيس الجامعة لشئون التعليم والطلاب

مؤسس وعميد كلية الدراسات العليا للعلوم المتقدمة

فكرة وحلم أصبح واقع

جاءت فكرة إنشاء كلية الدراسات العليا للعلوم المتقدمة من منطلق الحاجة الماسة إلي التجديد في البحث العلمي والتعمق في المساحة البيئية للعلوم المختلفة وإيماننا بأن الجديد في البحث العلمي يأتي من تلاقي العلوم البحثية.

واجهت الفكرة الكثير من النقد و التقييم حتى ظهرت للنور متبلوره في صورته ممتازة، حيث راهن مؤسسو الكلية على فكرة إنشائها وبالفعل ربحوا رهانهم. فقد أصبحت كلية الدراسات العليا بحق منارة علمية داخل جامعة بني سويف حيث وصل معدل النشر هذا العام في حدود (٥) علماً بأن معدل النشر الدولي للجامعات المصرية هو (١).

وتضم الكلية معامل حديثة متطورة وباحثين من طراز فريد وبيئة عمل ممتازة يعمل فيها الجميع بروح الفريق ويهدفون لإنتاج بحث علمي متميز يخدم المجتمع السويفي بصفة خاصة والمجتمع المصري بصفة عامة. و يتم اختيار الطلاب على أسس التميز العلمي والفكر الابتكاري وتتنبى المتميزين والمبتكرين حيث نسمع وناقش وننقد بروؤية تنتج بحث علمي هادف لحل المشكلات.

أربعة أعوام مضت على إنشاء كلية الدراسات العليا للعلوم المتقدمة حققت خلالها الكلية أكثر من ٧٠ بحث علمي متميز في مجلات دولية متطورة مرموقة ومصنفة، وذات معامل تأثير وأكثر من (١٠) براءات اختراع تم تسجيلها ومنح عدد من الدرجات العلمية المختلفة من (دبلومات متخصصة - ماجستير- دكتوراه) وما زال العطاء ومسيرة النجاح مستمرين.

والله الموفق والمستعان ،،،

دكتور/ أحمد علي فرغلي

أستاذ مساعد علوم المواد و تكنولوجيا النانو

وكيل الكلية للدراسات العليا و البحوث

المدير التنفيذي لوحدة تطوير البحث العلمي بجامعة بني سويف



مقدمة عن الكلية

نظراً للتطور السريع والمتلاحق للعلوم الحديثة وتطبيقاتها في الصناعة وازدياد الطلب على تحديث قدرات الافراد للنهوض بالصناعة والمجتمع داخل وخارج الجامعة . ونظراً لتداخل التخصصات والمجالات العلمية على بعضها البعض فانه اصبح من الضروري ربط البحوث بالصناعة من خلال العلوم التكنولوجية المتقدمة . ونظراً لأن قطاع الدراسات العليا والبحوث بجامعة بنى سويف يركز فى مجال التدريب المتخصص على مجالات تطوير التعليم العالى والدراسات العليا والبحث العلمى وتتبنى جامعة بنى سويف سياسات ترمى إلى دعم اعضاء هيئة التدريس والهيئة المعاونة الى جانب الباحثين بالمؤسسات والمراكز البحثية ويعتبر هذا التوجه تميزا نسبيا للمنافسة فى المجال التدريبي والذى يتنامى بشكل كبير على المستوى العربى والأفريقي .

لذا يتطلب هذا ان تستمر مراعاة البعد الأقليمي العربى والقارى الأفريقي فى ممارسة النشاطات التدريسية والدراسات العليا لرفع قدرات معاونة و أعضاء هيئة التدريس ودعم جهود البحث العلمى والارتقاء بها . وعلى هذا فاننا نقترح انشاء كلية الدراسات العليا للعلوم المتقدمة .

يعد الاهتمام بالتعليم العالى من أكثر الموضوعات حيوية وإثارة على صعيد العلم والمعرفة، وأن عملية الاستثمار فيه من أبرز أنواع الاستثمار فى رأس المال البشرى. إذ أنه يقوم على تنمية الأفراد، والعمل على تطوير مستوى التعليم والتدريب والبحث العلمى، إذ كما يعرف أن المجتمع المصرى مجتمعاً شاباً، ومن خلالهم يسعى التعليم الجامعي إلى إبراز شخصياتهم وتحقيق تطلعات المجتمع من خلال إعداد الطاقات البشرية المتعلمة والمدرّبة.

والتعليم العالى، وبالأخص الإلتحاق ببرامج الدراسات العليا، يعد من أكثر الإهتمامات الرائجة فى الوقت الراهن. ذلك لأهمية التعليم والإستمرار فيه، كمصدر قوة واستثمار على الأمد الطويل الذى لايد من تحقيق عائداته.

وأن للجامعات دورها الهام ومسؤوليتها العظيمة، تتمثل فى دخول الفكر العربى ميادين البحث العميق، أخذاً طريقه نحو البروز والتميز والمشاركة الفعالة فى التقدم البشرى.

لذا فإن الجامعات تعمل على أن يظهر دورها الفعال فى تحقيق وبلوغ الإبداع والتقدم العلمى، والقدرة على المنافسة ومجاراته الواقع فى مجالات الفكر والعلم والمعرفة.

كما أن البحث في دوافع الالتحاق ببرامج الدراسات العليا، يؤدي إلى معرفة أثرها في مساعدة أصحاب القرار في تحديد الاتجاهات لدى المجتمع والتخصصات المرغوبة اجتماعياً، بالتالي يتم تطوير المساقات والبرامج المرغوبة لدى كل فئة اجتماعية، ومعرفة مدى تطابقها مع احتياجات التنمية المستدامة وحاجات سوق العمل.

لا يكاد يختلف اثنان على جوهر العلاقة القوية بين البحث العلمى بأشكاله ومستوياته المختلفة من جهة، وبين التنمية من جهة أخرى ، الأمر الذي جعل العديد من الكتاب والمختصين في مجال البحث العلمى والتنمية والاقتصاد، يتحدثون باهتمام حول أهمية دور العلم والبحث العلمى في تطوير المجتمع وتنميته اقتصاديا وسياسيا وبشريا بل وروحيا وعاطفيا، كي يكون الإنسان في هذا المجتمع قادراً على التكيف مع بيئته ، والإسهام في حل مشاكله ومشاكل مجتمعه، بل وحتى المساهمة في حل مشكلات العالم الذي هو جزء منه، وكذلك المشاركة الفعالة في بناء الحضارة الإنسانية والمساهمة في تطويرها. كما تحدث البعض عن ضرورة ربط البحث العلمى بالتنمية، وتوثيق الصلة بين البحث والتأهيل المهني والتقني وسوق العمل، من منطلق الإستجابة لحاجات المجتمع الاقتصادية والثقافية والحضارية، كما تحدث البعض عن أهمية مساهمة العملية التعليمية في مسيرة المجتمع التنموية لدرجة اعتبار التعليم العالي وبعد الجامعى أحد المحركات الأساسية للتنمية المستدامة والشاملة.

وقد اهتمت بعض الدول الأوروبية و الأفريقية بإنشاء بعض الكليات و المعاهد التى تهتم بالتعليم ما بعد الجامعى لكى تواكب التطور السريع وتلحق بركب الدول المتقدمة على سبيل المثال كلية الدراسات العليا التابعة للكلية الملكية للجراحين فى أيرلندا و كلية الدراسات العليا يانجلترا و السويد وألمانيا وكذلك الكلية التابعة لجامعة كوفينانت بنيجريا و التى استطاعت أن تجعل أبحاثها ذات تصنيف جيد بين دول العالم. وفى مصر تم إنشاء بعض المعاهد المتخصصة فى تدريس برامج ما بعد التعليم الجامعى مثل معهد البحوث والدراسات البيئية بجامعة عين شمس و معهد الدراسات العليا و البحوث-جامعة الأسكندرية ومعهد الدراسات الإحصائية بجامعة القاهرة. و إيماناً من جامعة بنى سويف بضرورة مواكبة التطور السريع الذى يحدث فقد قامت الجامعة فى السنوات القليلة السابقة بالإهتمام بالعلوم الحديثة مثل علم النانو تكنولوجى و ذلك من خلال دعم وحدة علوم و تكنولوجيا النانو التابعة للجامعة و قد رأت إدارة الجامعة أن تستكمل هذه المسيرة الناجحة من خلال إنشاء كلية الدراسات العليا للعلوم المتقدمة و التى من المتوقع لها أن ترفع من شأن جامعة بنى سويف بين الجامعات العالمية.

رؤية ورسالة الكلية والأهداف الإستراتيجية

أولاً: الرؤية :

ان تصبح الكلية مدرسة علمية متميزة فى مجال إجراء البحوث والدراسات العلمية المتقدمة بين الجامعات والمراكز البحثية محليا واقليميا وعالميا. كما تساهم فى حل المشكلات الصناعية و تحقيق التنمية المستدامة .

ثانياً: الرسالة:

إعداد كوادر بحثية ومهنية متخصصة ومؤهلة لتلبية حاجة العمل والمساهمة فى دراسة وبحث المشكلات الصناعية ذات الطابع المحلى والإقليمى والعالمى من خلال الدراسات والبحوث العلمية التطبيقية والعمل على تنمية واستدامة الموارد وإعداد أليات مناسبة لقياس معدلاتها بما يتفق مع المعايير الدولية وبناء شراكات مع مختلف المؤسسات المعنية بالبحث العلمى .

ثالثاً: الأهداف الاستراتيجية :

- التوسع فى البحوث التطبيقية فى المجالات الجديده والاستشارات العلمية الصناعية التى تعتمد على العلوم المتقدمة.
- توفير خدمات تعليمية وتدريبية ذات جودة عالية تزيد من قدرات طلاب الدراسات العليا التنافسية فى سوق العمل والتوسع فى استخدام التعليم الإلكتروني والتعلم الذاتى لدى الطلاب.
- زيادة فاعلية البرامج والمناهج التعليمية لكى تحقق المقاييس المهنية والعلمية العالمية وذلك بالتعاون مع الجهات المستفيدة فى سوق العمل على المستوى المحلى والعربى والأفريقي.
- تشجيع التميز فى الأداء لدى الطلاب وهيئة التدريس والعاملين مع التركيز على نشر مبادئ وأخلاقيات البحث العلمى.
- تأهيل الكلية للإعتماد الأكاديمى من الهيئات القومية والإقليمية والعالمية.
- إنشاء المعمل المركزى لتطوير البيئة التعليمية والتكنولوجية والبنية التحتية التى تساعد على التعليم وإجراء البحوث والذى يهدف الى :
 ١. القيام بإجراء التحاليل وعقد الدورات التدريبية.
 ٢. القيام بإجراء التحاليل اللازمة لتنفيذ مشروعات المراجعة البيئية والصناعية والدوائية.....الخ.
 ٣. إجراء الدراسات والدورات التدريبية العملية فى مجال العلوم المتقدمة.

٤. إجراء الدراسات العملية بالأجهزة الحديثة فى مجالات الاسمنت والغذاء والصرف الصحى والصبغات والسيراميك وغيرها.
٥. دراسات وبحوث معالجة المخلفات والتدوير والاسترجاع وإعادة الاستخدام.
٦. التعاون مع الوحدات المماثلة ذات الطابع الخاص بالجامعات وبيوت الخبرة الوطنية والعربية والافريقية (خصوصا دول حوض النيل) وذلك فى مجالات العلوم المتقدمة.

مجلس الكلية

يقوم المجلس بوضع السياسة العامة للكلية والخطة العامة للدراسات العليا والبحوث وخطط إنشاء المباني والدراسات الاقتصادية وإقرار المحتوى العلمى للمقررات الدراسية وكذلك وضع اللوائح وتنظيم أوجه الصرف ومتابعة الميزانية وتوزيع الاعتمادات وتنظيم وقيد وتسجيل الطلاب واقتراح منح الدرجات العلمية الدراسية والدورات التدريبية واقتراح تعيين اعضاء هيئة التدريس والندب من وإلى الكلية ودراسة الموضوعات التى يحيلها اليه مجلس الجامعة.

يتكون مجلس الكلية من العميد ووكلائه ورؤساء الأقسام العلمية ومديرو الوحدات ومدير المعمل المركزى (إن وجد) وعمداء أو وكلاء بعض الكليات فى ذات تخصص الكلية وبعض الشخصيات العامة من خارج الجامعة فى تخصصات ذات صلة بالكلية، ويقوم عميد الكلية بتنفيذ قرارات مجلس الكلية ويبلغ الجامعة بمحاضر الجلسات والقرارات خلال ثمانية أيام من صدورها.

يشكل مجلس الكلية من بين أعضائه ومن أعضاء هيئة التدريس والمتخصصين من داخل أو خارج الكلية لجان فنية لبحث الموضوعات التى تدخل فى اختصاصه وهى:

١. لجنة الدراسات العليا والبحوث:

تنظم العمل بالدراسات العليا من حيث طريقة التسجيل للطلاب والقواعد التى تتبع فى منح الدرجات العلمية والنظر فى حالات الطلاب بالنسبة للأعداد والتسجيل .

٢. لجنة شئون البيئة وخدمة المجتمع:

تساعد الكلية فى تنفيذ أهدافها فى التنمية المجتمعية والخدمات البيئية

٣. لجنة المختبرات والأجهزة:

حصر الإحتياجات لتدعيم المختبرات والأجهزة العلمية بالكلية بما يكفل رفع مستوى البحوث والدراسات العلمية وفق الإحتياجات.

٤. وحدة ضمان الجودة وتقويم الأداء:

تتابع عملية ضبط العملية التعليمية طبقا لمعايير الجودة المحلية والدولية

٥. لجنة العلاقات الثقافية:

تهتم بالبحوث والدراسات والمشاريع البحثية التي تغطي مختلف الدراسات بالكلية وذلك بالتعاون مع مراكز البحوث المتعددة سواء بداخل الوطن أو خارجه للإسهام فى خطط التنمية المستدامة للدولة وتقوم باقتراح سياسة لإيفاد أعضاء هيئة التدريس بالكلية فى مهمات علمية لمتابعة التقدم العلمى فى مجال تخصصاتهم , بالإضافة الى استضافة الأساتذة الأجانب والإعداد والمشاركة فى المؤتمرات وتنظيم المنح الداخلية والخارجية لأعضاء هيئة التدريس والهيئة المعاونة وتقديم الدعم للمشروعات البحثية ودعم النشر العلمى.

أقسام الكلية

تتكون الكلية من ٤ أقسام رئيسية :

- قسم علوم المواد وتكنولوجيا النانو .
- قسم التكنولوجيا الحيوية وعلوم الحياة.
- قسم علوم البيئة و التنمية الصناعية.
- قسم علوم وهندسة الطاقة المتجددة .
- بالإضافة الى استحداث أقسام جديدة فى التخصصات الطبية والهندسية وفروع العلوم المتقدمة.

الشهادات والدرجات العلمية بالكلية

تمنح جامعة بنى سويف بناء على طلب مجلس الكلية الشهادات والدرجات العلمية الآتية:

١. شهادة الدبلوم فى التخصصات الآتية (التكنولوجيا الحيوية - الكيمياء الحيوية الطبية- علوم المواد وتكنولوجيا النانو- علوم البيئة والتنمية الصناعية - كيمياء وتكنولوجيا صناعة الأسمت- علوم وهندسة الطاقة المتجددة- دبلوم رقابة الجودة).
٢. درجة الماجستير فى التخصصات الآتية (التكنولوجيا الحيوية - الكيمياء الحيوية الطبية- علوم المواد وتكنولوجيا النانو - علوم البيئة والتنمية الصناعية - كيمياء وتكنولوجيا صناعة الأسمت - علوم وهندسة الطاقة المتجددة).
٣. درجة دكتوراه الفلسفة فى التخصصات الآتية (التكنولوجيا الحيوية - الكيمياء الحيوية الطبية- علوم المواد وتكنولوجيا النانو -علوم البيئة والتنمية الصناعية - كيمياء وتكنولوجيا صناعة الأسمت- علوم وهندسة الطاقة المتجددة).

قواعد عامة

- ١) تعرف الساعة المعتمدة بعدد ساعة واحدة نظرية و ساعتان او ثلاث ساعات عملية. كل ساعة نظرية لها ساعة إمتحانية على أن يخصص لكل ساعة معتمدة خمسون درجة.
- ٢) يجوز للقسم العلمي بعد أخذ رأي لجنة الدراسات العليا وموافقة مجلس الكلية إضافة أو حذف أي من المقررات الإختيارية طبقاً لما يتماشى مع أحدث المستجدات في مجالات تخصص البرنامج المقدم.
- ٣) يجوز لمجلس الكلية بناء على اقتراح مجلس القسم المختص وموافقة لجنة الدراسات العليا والبحوث احتساب مقررات على مستوى الدراسات العليا سبق للطالب دراستها بالكلية أو في أي معهد علمي معترف به من المجلس الأعلى للجامعات خلال الخمس السنوات السابقة على قيده بالكلية.
- ٤) يحدد مجلس القسم والكلية مرشد علمي لطلاب الدراسات العليا لمتابعته خلال الدراسة التمهيدية للماجستير وكذلك خلال دراستهم للدبلومات بالكلية.
- ٥) يحرم الطالب من التقدم لإمتحان إي مقرر دراسي لم يحقق نسبة حضور فيه قدرها ٧٥% ويكون ذلك بناء على تقرير من أستاذ المادة مع إحاطة مجلس القسم المختص وبموافقة لجنة الدراسات العليا والبحوث ومجلس الكلية وفي هذه الحالة يعتبر الطالب راسباً في هذا المقرر وتحسب عليه فرصة من فرص دخول الامتحان مع إخطار الطالب بذلك.
- ٦) يعقد امتحان الفصل الدراسي الأول للمقررات الدراسية خلال شهر يناير والفصل الدراسي الثاني خلال شهر يونيو ويجوز فتح مقررات في غير موعدها خلال الفصل الدراسي الأول أو الثاني أو خلال الفصل الدراسي الصيفي بناء على قرار مجلس الكلية تيسيراً للطلاب ودون الإخلال باللائحة.
- ٧) يمنح الطالب فرصة واحدة فقط لإعادة الامتحان في المقررات التي يرسب فيها، وفي حالة نجاحه يكون الحد الأقصى لتقديره حتى مقبول (٦٤%) ومن يرسب في أي فصل دراسي يؤدي الامتحان في ذات الفصل من العام التالي أو حسب مايقدره مجلس الكلية.

٨) يجوز لمجلس الكلية قبول إعتذار الطالب عن دخول الامتحان في مقرر أو أكثر لمرتين كحد أقصى للمقرر الواحد خلال دراسته إذا تقدم بطلبه قبل بدء الامتحان مدعماً بمبرر يقبله مجلس الكلية بعد اخذ رأى لجنة الدراسات العليا والبحوث والقسم المختص ويحدد مجلس الكلية مواعيد إجراء الامتحان للطلاب المعذرين.

مادة (٩): تقدير درجات النجاح والرسوب

يحدد التقدير العام في المقررات الدراسية بالدراسات العليا وكذلك في التقدير العام للطلاب بأحد التقديرات الآتية :

Percentage	Grade points	Grade	General Evaluation
90% and more	4	A	Excellent
85% to less than 90%	3.7	A-	
82.5% to less than 85	3.3	B+	Very good
77.5% to less than 82.5%	3	B	
75% to less than 77.5%	2.7	B-	
72.5% to less than 75%	2.3	C+	Good
67.5% to less than 72.5%	2	C	
65% to less than 67.5%	1.7	C-	
62.5% to less than 65%	1.3	D+	Pass
60% to less than 62.5%	1.00	D	
Less than 60%	0.00	F	Fail
Withdrawn	-	W	Withdrawn

Calculation of GPA

$$GPA = \frac{\text{Sum of (grade points multiplied by number of credit hours)}}{\text{Total number of credit hours}}$$

يمنح الطالب شهادة بتقديرات المواد ، فى نهاية الفصل الدراسى الذى تم فيه اجتيازه لجميع المقررات التى قام بالتسجيل بها، باللغة العربية أو اللغة الانجليزية وبناء على طلبه يذكر فيها اسم المادة والتقدير والنسبة المئوية وكذلك الساعات المعتمدة.

مادة (١٠): طرق التقييم

أ. للمقررات التي تحتوى على محتوى عملي:

يتم تقييم المقررات التي تم دراستها كلاً حسب محتواه من خلال:

- إختبار تحريري ويمثل (٦٠%)
- إختبار شفهي أو مهام أو أنشطة بحثية ويمثل (١٠%) وسيتم طبقاً لمعايير محددة تعتمد على السمات الشخصية والحرفية المهنية المكتسبة وقياس استيعاب المعلومات والقدرة على تطبيقها.
- إختبار عملي ويمثل (٣٠%).

ب. للمقررات التي لا تحتوى على محتوى عملي:

يتم تقييم المقررات التي تم دراستها كلاً حسب محتواه من خلال:

- إختبار تحريري ويمثل (٨٠%)
 - إختبار شفهي أو مهام أو أنشطة بحثية ويمثل (٢٠%) وسيتم طبقاً لمعايير محددة تعتمد على السمات الشخصية والحرفية المهنية المكتسبة وقياس استيعاب المعلومات والقدرة على تطبيقها.
- مدة الأختبارات النظرية من ساعة الى ساعتين على حسب وزن المقرر وعدد الساعات المعتمدة الخاصة به.

مادة (١١): إيقاف القيد

يجوز لمجلس الكلية بناء على إقتراح مجلس القسم المختص ولجنة الدراسات العليا بالكلية أن يوقف قيد الطالب المقيد بالدراسات العليا (دبلوم – ماجستير – دكتوراه الفلسفة) لمدد لا تزيد في مجموعها عن ٢٤ شهراً وبشرط أن يكون إيقاف القيد عن سنوات مقبلة وليس عن سنوات سابقة وأن يكون إيقاف القيد في المدة الأساسية وليس في فترات مد القيد وذلك في الحالات الآتية :

- أ. التجنيد : يتقدم الطالب بطلب لإيقاف قيده طوال مدة تجنيده خلال ثلاثة الأشهر الأولى من تاريخ تجنيده مع تقديم المستندات الدالة على ذلك .
- ب. السفر للخارج في مهمة رسمية أو أجازة : يتقدم الطالب بطلب قبل سفره أو خلال الشهر الأول من سفره مدعماً بالمستندات ويقدم الطالب لدى عودته المستندات الدالة على قيامه بالمهمة أو الأجازة.
- ت. المرض : يتقدم الطالب بطلب عند مرضه مدة لا تقل عن شهر مدعماً بشهادة مرضية معتمدة من الإدارة الطبية بالجامعة ومحدداً فيها مرضه.

- ث. الوضع ورعاية الطفل : على الطالبة أن تتقدم بطلب وقف القيد للوضع أو لرعاية الطفل مدعماً بشهادة ميلاده .
- ج. حالات أخرى يقبلها مجلس الكلية بعد اخذ رأى لجنة الدراسات العليا والبحوث.

مادة (١٢) : إلغاء القيد

- يقوم مجلس الكلية بإلغاء قيد الطالب فى الحالات الآتية:
- أ. تقدم الطالب بطلب لإلغاء قيده للدرجة وموافقة المشرفين على ذلك.
- ب. عدم سداد الرسوم المقررة طبقاً للقواعد المنظمة.
- ت. إنقطاع الطالب عن الدراسة أو عدم جديته فى البحث وذلك بناء على تقرير من المشرفين وموافقة مجلس القسم المختص ولجنة الدراسات العليا والبحوث.
- ث. إذا رفضت لجنة الحكم الرسالة وتوصيتها بعدم منح الدرجة سواء فى الماجستير أو الدكتوراه.
- ج. عدم منح الدرجة خلال المدد المنصوص عليها باللائحة مع مراعاة حالات وقف القيد.
- ح. رسوب الطالب سواء بالدبلوم أو السنة التمهيدية للماجستير فى أى من المقررات الدراسية أكثر من مرة ولا يجوز تقدم الطالب بأكثر من عذرين للمقرر الواحد طيلة فترة قيده ويجوز ظروف خاصة قبول عذر ثالث (أخير) بصفة استثنائية بعد موافقة مجلس القسم والكلية ومجلس الدراسات العليا بالجامعة وذلك فى حالة رسوب الطالب فى مادتين بحد أقصى.

مادة (١٣) : إعادة القيد

- أ. إذا تم إلغاء قيد الطالب، يجوز لمجلس الكلية بناء على اقتراح مجلس القسم المختص وموافقة لجنة الدراسات العليا والبحوث إعادة قيده فى المواعيد المحددة للقيد بعد مرور عام على إلغاء القيد على الأقل ويراعى أن تطبق عليه القواعد التى تطبق على الطالب المستجد. ويجوز أن يعفى من بعض مقررات السنة التمهيدية إذا لم يمض على نجاحه فيها أكثر من خمسة سنوات وبناء على موافقة القسم المختص. وعلى الطالب أن يتقدم بطلب إعادة القيد فى المواعيد المحددة لذلك والشروط العامة للقيد والشروط الخاصة بالقيد لكل درجة طبقاً لللائحة.
- ب. يجوز إعادة القيد مباشرة إذا وافق مجلس القسم ومجلس الكلية للمعيدين والمدرسين المساعدين المقيدىن بمرور مدة زمنية محددة للحصول على درجة الماجستير أو الدكتوراه.

مادة (١٤): الرسوم الدراسية

- أ. يتم تسديد الرسوم الدراسية المقررة علي الطلاب المقيدین مسبقاً خلال شهر أكتوبر من كل عام.
- ب. يلغى قيد الطالب تلقائياً في حالة عدم سداذه الرسوم الدراسية المقررة خلال شهرين من بداية العام الدراسي دون الحاجة إلى إنذاره.
- ت. لا تسترد الرسوم الدراسية بعد موافقة مجلس الكلية على القيد أو التسجيل .

مادة (١٥): الإشراف على الرسائل العلمية

- يسمح بالتسجيل لرسالة الماجستير في أى وقت من العام الدراسي بعد اجتياز الطالب لجميع المقررات التي قام بالتسجيل بها.
- تحديد عدد المشرفين على رسالة الماجستير بثلاثة مشرفين والدكتوراه أربعة مشرفين كحد أقصى.
- ألا يزيد عدد المشرفين الذين يمكن الاستعانة بهم من خارج الجامعة عن المشرفين من الجامعة .
- عدم جواز إشراف عضو هيئة التدريس على الرسائل العلمية المقدمة من زوجه او أحد أقاربه حتى الدرجة الرابعه نسباً مع تطبيق ذلك على لجنة للتحكيم وعدم جواز اشتراك عضو هيئة تدريس وزوجة وأحد أقاربه حتى الدرجة الرابعة نسباً او مصاهرة في الإشراف على الرسالة .
- ألا تشكل لجان الحكم على الرسائل العلمية للطلاب الذين يضاف إليهم مشرف جديد إلا بعد مرور ستة أشهر على الأقل من إضافة المشرف مع مراعاة أن تكون مدة القيد الباقية للطالب تسمح بذلك .
- في حالة سفر أحد المشرفين إلى الخارج فلمجلس الكلية أن يترك لجنة الإشراف دون تعديل أو يضيف عضواً إلى لجنة الإشراف أو يرفع اسم المشرف الذي سافر إلى الخارج من لجنة الإشراف أو كليةما وذلك بناء على إقتراح مجلس القسم المختص وموافقة لجنة الدراسات العليا والبحوث وبناء على التقرير الذي يقدمه المشرف قبل اخلاء طرفه للسفر مدعماً برأي المشرف الرئيسي مع عدم الإخلال باللائحة.
- لمجلس الكلية أن يقوم بتعديل لجنة الإشراف بالرفع أو الإضافة أو بكلية ما بناء على إقتراح المشرف الرئيسي وموافقة مجلس القسم المختص ولجنة الدراسات العليا والبحوث مع عدم الإخلال باللائحة.

- يقدم المشرف الرئيسي في نهاية كل عام دراسي تقريراً إلى مجلس القسم المختص عن مدى تقدم الطالب في دراسته وللمشرف الرئيسي أن يوصي باستمرار القيد أو إلغائه.

مادة (١٦): الرسالة العلمية

- يقوم الطالب سواء في الماجستير أو الدكتوراه بعمل حلقة دراسية (سيمينار) قبل التسجيل وكذلك قبل التقدم بالرسالة بشهر واحد على الأكثر.
- بعد انتهاء الطالب من إعداد الرسالة وتوقيعها من المشرف الرئيسي يقوم بتسليم نسختين من الرسالة إلى رئيس مجلس القسم المختص لتحديد موعد محاضرة عامة عن موضوع الرسالة طبقاً للقواعد المنظمة لذلك .
- يتقدم المشرف الرئيسي إلى مجلس القسم المختص بطلب تشكيل لجنة الحكم على الرسالة.
- بعد قبول الرسالة من لجنة الحكم وعمل التعديلات اللازمة يقدم الطالب أسطوانة مدمجة للرسالة (اقراص مدمجة ومليزرة) وأربع نسخ معتمدة من رئيس مجلس القسم وخمس ملخصات باللغة العربية وخمس ملخصات باللغة الإنجليزية معتمدة من المشرف الرئيسي ورئيس مجلس القسم المختص إلى إدارة الدراسات العليا بالكلية.
- لا يجوز التقدم برسالة الماجستير إلا بعد عام، كما لا يجوز التقدم برسالة الدكتوراه إلا بعد عامين من تاريخ موافقة الكلية على التسجيل وذلك تطبيقاً لقرار مجلس الدراسات العليا والبحوث بالجامعة.

مادة (١٧): لجنة الحكم على الرسالة

- أ. يتم عرض الرسالة على لجنة تحكيم تتكون من المشرف الرئيسي على الرسالة ومحكمين آخرين أجانبين (من خارج مصر).
- ب. تكون مدة صلاحية لجنة الحكم على الرسالة ستة أشهر من تاريخ موافقة نائب رئيس الجامعة للدراسات العليا والبحوث ويمكن تجديد تشكيل لجنة الحكم مرة أخرى .
- ت. للمحكم أن يوصى في تقريره بإحدى التوصيات التالية:
 ١. قبول الرسالة كما هي.
 ٢. قبول الرسالة بعد إجراء بعض التصويبات.
 ٣. تأجيل المنح لإجراء التصويبات او التعديلات الجوهرية وبعدها أقصى ثلاث شهور أو طبقاً لقرار مجلس الكلية .

٤. إعادة عرض الرسالة على المحكم بعد إجراء التصويبات او التعديلات الجوهرية في خلال فترة محددة.
٥. رفض الرسالة.
- ث. يتم إعادة الرسالة إلى الطالب لاستكمال ما تراه اللجنة من نقص ويعطى الطالب فرصة لعمل المطلوب مع مراعاة فترة صلاحية تشكيل اللجنة ومدة التسجيل للدرجة ويتم ذلك تحت إشراف المشرفين واعتماد رئيس القسم.

مادة (١٨): قواعد قبول الطلاب الوافدين

- يشترط لقيد الطلاب الوافدين للدراسة بالكلية إتمام الإجراءات التالية:
- أ. التقدم للكلية بالمستندات الآتية : أصل الشهادات الدراسية موثقة من وزارة الخارجية المصرية - شهادة الميلاد - عدد "٤" صور شخصية حديثة - شهادة صحية - معادلة المؤهل الدراسي من المجلس الأعلى للجامعات - خطاب رسمي من السفارة المعنية للترشيح للدراسة في حالة الدراسة على نفقة دولة الطالب.
- ب. موافقة المجلس المختص في الكلية على قبول الطالب بصفة مبدئية.
- ت. يتم قبول الطالب بصفة مبدئية بالكلية لحين موافقة إدارة الوافدين.
- ث. موافقة مجلس الكلية والجامعة على قيد الطالب.
- ج. على الطلاب الوافدين تقديم ما يثبت حصولهم على الحد الأدنى للإقامة داخل جمهورية مصر العربية وهو سنتان دراسيتان.

برامج الدراسات العليا
Postgraduate Programs

أولاً: الدبلومات

شروط القيد ببرامج الدبلوم

- أ. أن يكون الطالب مستوفى لشروط القيد الواردة باللائحة.
- ب. يجوز لمجلس القسم المختص أن يكلف الطالب بدراسة بعض مقررات مرحلة البكالوريوس على ان لا تحتسب ضمن الساعات المعتمدة للدبلوم طبقاً لللائحة.
- ت. مدة الدراسة لنيل أي من دبلومات الدراسات العليا عام أكاديمي يتفرغ خلالها الطالب لدراسته النظرية والعملية والتدريبية.
- ث. الحد الأقصى للحصول على شهادة الدبلوم هو ثلاث سنوات من تاريخ قيده غير شاملة الأعذار المقبولة.

دبلوم علوم المواد وتكنولوجيا النانو

Diploma of Materials science and Nanotechnology

Courses

1. First Semester:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
NT501	Materials Science 1	علوم المواد ١	2	2	0	2	100
NT502	Applied Physical Chemistry	الكيمياء الفيزيائية التطبيقية	2	2	0	2	100
NT503	Nano-biotechnology	التكنولوجيا الحيوية النانومترية	2	2	0	2	100
NT504	Instrumental Analysis	التحليل الآلي	3	2	1	2	150
NT505	Fundamentals of Nanoscience	أساسيات علوم النانو	2	2	0	2	100

NT506	Scientific Thinking and Writing	التفكير والكتابة العلمية	1	1	0	1	50
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2. Second Semester:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
NT507	Materials Science 2	علوم المواد 2	2	2	0	2	100
NT508	Nanotubes: Production to Application	الأنابيب النانومترية: من الإنتاج إلى التطبيقات	2	2	0	2	100
NT509	Preparation and characterization of nanomaterials (Practical Course)	تحضير وتوصيف العملي للمواد النانومترية (مقرر عملي)	2	0	2	2	100
NT510	Nanomaterials for catalysis	المواد النانومترية المحفزة	2	2	0	2	100
NT5711	Health and Environmental Impact of Nanotechnology	الأثر الصحي و البيئي للمواد النانومترية	2	2	0	2	100
NT512	Biomedical Applications of Nanomaterials	التطبيقات الحيوية الطبية للمواد النانومترية	1	1	0	1	50
NT513	Materials & Nanotechnology	مشروع تكنولوجيا	1	1	0	1	50

	Project	المواد والتكنولوجيا النانومترية					
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Elective Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
NT514	Nanotechnology of Engineering and Construction Materials	التكنولوجيا النانومترية وهندسة مواد التشييد و البناء	1	1	0	1	50
NT515	Good Laboratory Practices and safety	الممارسات والأمان المعملية	1	1	0	1	50
NT516	Semiconductor Nanostructures	المواد النانومترية الشبه موصلة	2	2	0	2	100
NT517	Nanoparticle and thin film technology	تكنولوجيا الطبقات الرقيقة والجزينات النانومترية	2	2	0	2	100
NT518	Fabrication Techniques for Micro and Nano Devices	طرق تصنيع الأجهزة الميكرومترية والنانومترية	1	1	0	1	50
NT519	The Physics of Nanostructures	فيزياء المواد النانومترية	1	1	0	1	50
NT520	Microelectronics, Photonics and optoelectronics	الإلكترونيات الميكرومترية , الضوئيات والإلكترونيات الضوئية	1	1	0	1	50
NT521	Solar energy – Photovoltaics	الألواح الشمسية	2	2	0	2	100

NT522	Energy conversion and storage	تحويل و تخزين الطاقة	2	2	0	2	100
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Total Credits = 24 Compulsory Courses + 4 Elective Courses

Complementary Courses (set by the department)							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
CN 101	Physical Chemistry	الكيمياء الفيزيائية	2	2	0	2	100
CN 102	Analytical Chemistry	الكيمياء التحليلية	2	2	0	2	100
CN 103	Waves and Optics	الضوئيات والموجات	2	2	0	2	100
CN 104	Thermodynamics	الديناميكا الحرارية	2	2	0	2	100
CN 105	Surface Chemistry	كيمياء السطوح	2	2	0	2	100
CN 106	Properties of Matter	خواص المادة	2	2	0	2	100
CN 107	Selected Topics in Chemistry	مواضيع مختارة في الكيمياء	2	2	0	2	100
CN 108	Selected Topics in Physics	مواضيع مختارة في الفيزياء	2	2	0	2	100

Course Specifications

NT501 Materials Science 1

Crystal structure and symmetry-lattice imperfection in solids – Mechanical properties of solids – Creep and Fatigue of solids – Electrical and magnetic properties of solids - Classifications of magnetic materials – Types of Defects in Crystalline materials – The Production of Defects

in Solids – Effect of Lattice Defects on the Physical and Mechanical Properties of Solids- Interaction of Dislocations with Point Defects.

NT502 Applied Physical Chemistry

Gas solid reactions

Polymer science: Introduction – Polymerization – Chemical and physical properties of polymers – Types of polymerization - Thermal properties of polymers - Characterization of polymers.

Electrochemistry: Introduction, Studies of the different types of electrodes and electrochemical cells in different molten salts. Electrodeposition.

Surface chemistry, surfactants

NT503 Nano-biotechnology

The aim of this course is to convey a well-founded, wide-ranging basis of knowledge for developing, implementing and evaluating nanobiotechnological applications. In this way, the course graduates should find themselves in a position, where they are able to assess the manifold interrelationships and effects of these new technologies. On this basis, they will have the ability to elaborate useful applications for their own institutions on surfaces; transduction and control of materials and information through biological interfaces; bilayers; bioelectronics; biosensors.

This module covers: interactions of biological molecules with surfaces; manipulation of bio-molecules.

NT504 Instrumental Analysis

Automated methods of analysis, overview of automatic instruments, Instrumentation, flow injection analysis, discrete automatic systems, Analysis based upon multilayer films - Thermogravimetric methods (TG), Differential thermal analysis (DTA), Differential scanning calorimetry (DSC). FTIR_FTRAMAN, Atomic Absorption, XRD, HPLC, mass spectrometry. TEM and SEM, BET, Zeta sizer.

NT505 Fundamentals of Nanoscience

Introduction to nanoscience – definition of nanomaterials and nanoscale. Preparation methods of nanostructures including up-down and bottom-up techniques. Selected industrial applications of nanomaterials

NT506 Scientific thinking and writing

Scientific Planning – How to use a research engine - How to write a proposal – How to write a paper – Research ethics – Publication – social media.

NT507 Materials Science 2

The different modern theories of superconducting materials - Absorption of direct and indirect Semiconductor transitions –Optical constants Relations-Photo and electroluminescence-Photoconductivity – Semiconductor Nanotechnology - Methods of preparations of thin films- Mechanism of film Formation-Electrical Properties of thin films - Electrical and magnetic properties of superconductors- The basis of magnetism: classical and quantum mechanical points of view. Different kinds of magnetic materials. Magnetic phenomena including anisotropy, magnetostriction, domains, and magnetization dynamics. Current frontiers of nano-magnetics research including thin films and particles. Optical, data storage, and biomedical engineering applications of soft and hard magnetic materials.

NT508 Nanotubes: Production to Application

Production of nanotubes with different composition- characterization of the nanotubes using Field Emission SEM and High Resolution TEM- industrial application of the nanotubes
Selected topics in the scope of the most recent applications of nanotubes.

NT509 Preparation and characterization of nanomaterials

Practical preparation of nanomaterials by hydrothermal, microwave, precipitation, Characterization of the prepared materials.

NT510 Nanomaterials for catalysis

Catalysis- types of catalysis (homogenous catalysis, heterogeneous catalysis, auto-catalysis)- theories of catalysis – nanomaterials for catalysis (Practical examples from industry).

NT511 Health and Environmental Impact of Nanotechnology

This course covers the environmental and health aspects of nanotechnology. It presents an overview of nanotechnology along with characterization and properties of nanomaterials. The course material covers the biotoxicity and ecotoxicity of nanomaterials. A sizable part of the course is devoted to discussions about the application of nanotechnology for environmental remediation along with discussions about fate and transport of nanomaterials. Special emphasis is given to risk assessment and risk management of nanomaterials, ethical and legal aspects of nanotechnology, and nano-industry and nano-entrepreneurship. Nanomaterials and pollution control. Waste water treatment, Water desalination, membranes, nanomembranes and nanofilters.

NT512 Biomedical Applications of Nanomaterials

Medical applications of nanomaterials in: drug delivery – pharmaceuticals formulation – Targeting – Detecting- Imaging and cancer treatment.

NT513 Materials & Nanotechnology Project

Selecting a topic deals with nanoscience and nanotechnology and writing an essay on the topic with standard level of English language and science (may include an experimental part).

NT514 Nanotechnology of Engineering and Construction Materials

This course would cover the nanotechnology of the most widely used building materials such as concrete, asphalt, and wood. Structural design properties, including strength and durability, will be related to nanoscale considerations. Laboratory exercises will relate gross properties, such as strength and permeability, to nanoscale measurements and imaging.

NT515 Good Laboratory Practices and safety

Hazardous Chemical /Substance Spills – Fires - Weather Alerts - First Aid
- Identification of Chemical Hazards - Chemical Inventories and Labeling
- Personal Safety - Standard Laboratory Safety Equipment - Fire Prevention - Chemical and Hazardous Waste Identification and Disposal

NT516 Semiconductor nanostructures

This module covers the physics and technology of semiconductor nanostructures, considering both the present status and possible future trends. It includes ultra-small and low dimensional devices (quantum wire and quantum dot lasers, single electron devices); self-assembly of semiconductor nanostructures; physical processes in semiconductor nanostructures; electronic and optical characterization techniques for semiconductor nanostructures.

NT517 Nanoparticle and thin film technology

This module will provide an understanding of methods for producing and characterizing nanoparticles and thin films of inorganic materials, hands-on training in synthesizing nanoparticles and films, and an appreciation of their potential applications in electronic, biomedical and structural engineering.

NT518 Fabrication Techniques for Micro and Nano Devices

Deals with aspects of the technology of processing procedures involved in the fabrication of microelectronic devices and microelectromechanical systems (MEMS). Students will become familiar with various fabrication techniques used for discrete devices as well as large-scale integrated thin-film circuits. Students will also learn that MEMS are sensors and actuators that are designed using different areas of engineering disciplines and they are constructed using a microlithographically-based manufacturing process in conjunction with both semiconductor and micromachining microfabrication technologies

NT519 The Physics of Nanostructures

Progress in the technology of nanostructure growth; space and time scales; quantum confined systems; quantum wells, coupled wells, and superlattices; quantum wires and quantum dots; electronic states; magnetic field effects; electron-phonon interaction; and quantum transport in nanostructures: Kubo formalism and Butikker-Landau formalism; spectroscopy of quantum dots; Coulomb blockade, coupled dots, and artificial molecules; weak localization; universal conductance fluctuations; phase-breaking time; theory of open quantum systems: fluctuation-dissipation theorem; and applications to quantum transport in nanostructures.

NT520 Microelectronics, Photonics and optoelectronics

An overview of microelectronics and photonics science and technology. It provides the student who wishes to specialize in their application, physics or fabrication with the necessary knowledge of how the different aspects are interrelated. It is taught in three modules: design and applications, operation of electronic and photonic devices, fabrication and reliability. This course covers the theory, design, fabrication and applications of photonic materials and devices. After a survey of optical materials design for semiconductors, dielectrics and polymers, the course examines ray optics, electromagnetic optics and guided wave optics; physics of light-matter interactions; and device design principles of LEDs, lasers, photodetectors, modulators, fiber and waveguide interconnects, optical filters, and photonic crystals. Device processing topics include crystal growth, substrate engineering, thin film deposition, etching and process integration for dielectric, silicon and compound semiconductor materials. The course also covers microphotonic integrated circuits and applications in telecom/datacom systems.

NT521 Solar energy- Photovoltaics

Solar energy is like wind energy an important source of sustainable and renewable energy. Therefore, learning more about technology that converts solar energy into electricity, heat and solar fuels might be a good investment. Photovoltaic (PV) devices are presented in this course as advanced semiconductor devices that deliver electricity directly from sunlight. The emphasis is on understanding the working principle of a solar cell, fabrication of solar cells, PV module construction and the design of a PV system. The student will understand the principles of the photovoltaic conversion (the conversion of light into electricity). The student will learn about the advantages, limitations and challenges of different solar cell technologies, such as crystalline silicon solar cell technology, thin film solar cell technologies and the latest novel solar cell concepts as studied on lab-scale.

Fundamentals of Photovoltaics. Photovoltaics and the Renewable Electricity Grid. Crystalline Silicon Photovoltaics. Material and Solar Cell Characterization and Modelling.

NT522 Energy conversion and storage

This course will focus on the engineering fundamentals of thermodynamics, flow and transport processes, as applied particularly in the current topics of interest such as fuel cells and other direct conversion systems, but encompassing also future forms of traditional systems. The course incorporates fundamentals, process and system's analysis tools in the broad energy area, intended to educate future leaders in the field of energy technology, and is not constrained by disciplinary boundaries or limited to a monolithic view of energy conversion and utilization. The course will cover the underlying common principles of energy systems, and the analytical, experimental and computational tools used in their analysis, design and optimization. The course covers energy conversion, utilization and storage by introducing the common concepts and tools used in this field within a generic framework that allows students to analyze several alternative systems and determine according to fundamental principles which approach is compatible with the intended performance. The course covers indirect and direct energy conversion, energy conversion involving renewable sources (geothermal, electromagnetic and kinetic), the optimal integration of heterogeneous energy systems for hybrid operation, the production of energy carriers, like hydrogen, and synthesized fuels, the utilization of knowledge to maximize flexibility and extend the performance envelope, etc. It covers fundamental physical chemistry of energy conversion, both at the macroscopic and microscopic levels, and how these systems are engineered and integrated into functional modalities. The course will cover macroscopic and microscopic analysis of direct and indirect energy conversion in thermochemical, electrochemical, thermomechanical and other processes. Material includes chemical thermodynamics and kinetics in homogeneous and heterogeneous environment; kinetic theory and transport phenomena in energy systems, critical flow processes and how they impact performance. Applications to systems utilizing fossil fuels, hydrogen, and renewable resources, including electrochemical cells, catalysis, photovoltaics, supercritical and combined cycles. Examples form very large-scale power plants to microscale energy and propulsion devices will be used to demonstrate

the approach and the future trends. The course provides advanced training on energy issues covering techniques for energy storage and chemical generation, including advanced battery design; fuel cells; hydrogen generation and storage systems; heat recovery and storage in the process industries.

CN101 Physical chemistry

The properties of gases- chemical equilibrium- phase diagrams- molecular structure- Molecular spectroscopy.

CN102 Analytical chemistry

Stoichiometric calculations- general concepts of chemical equilibrium- precipitation reactions and titrations- chromatography

CN103 Waves and optics

Mechanical vibrations and waves – electromagnetic waves – mechanics and electromagnetism - reflection, refraction, and diffraction.

CN104 Thermodynamics

The internal energy and the entropy – enthalpy – 1st and 2nd law of thermodynamics – Carnot cycle.

CN105 Surface chemistry

Surfaces and interfaces – adsorption – structure of surfaces – thermodynamics and dynamics of surfaces – catalysis by surfaces.

CN106 Properties of matter

Crystal lattices and crystal structure – properties of solids.

CN107 Selected topics in Chemistry

To be determined according to the department.

CN108 Selected topics in Physics

To be determined according to the department.

دبلوم التكنولوجيا الحيوية

Diploma of Biotechnology

Courses

1. First Semester:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
BT501	Biochemistry	الكيمياء الحيوية	1	1	0	1	50
BT502	Fermentation Technology	تكنولوجيا التخمير	2	1	1	1	100
BT503	Immunology	المناعة	2	1	1	1	100
BT504	Microbiology	الميكروبيولوجي (علم الأحياء المجهرية)	3	2	1	1	150
BT505	Principles of Molecular Biology	أساسيات البيولوجيا الجزيئية	2	1	1	1	100
BT506	Proteomics	علم البروتينات	2	1	1	1	100

2. Second Semester:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final Grades out of
	English	Arabic					
BT507	Plant Biotechnology	التكنولوجيا الحيوية النباتية	2	1	1	1	100
BT508	Bioinformatics	المعلوماتية الحيوية	2	1	1	1	100
BT509	Concepts of Genetic Engineering	مفاهيم الهندسة الوراثية	3	2	1	2	150

BT510	Applications of nanomaterials in biotechnology	تطبيقات المواد النانوية في مجال التكنولوجيا الحيوية	2	1	1	1	100
BT511	Instrumentation and lab safety	الأجهزة وسلامة المختبر	1	1	0	1	50
BT512	Modern Applications of Biotechnology	التطبيقات الحديثة للتكنولوجيا الحيوية	٢	2	0	2	100

Elective Courses

Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
BT513	Bioassay Development	تطوير التحاليل البيولوجية	2	2	0	2	100
BT514	Biochemical Engineering	هندسة الكيمياء الحيوية	2	1	1	1	100
BT515	Food Biotechnology	التكنولوجيا الحيوية للأغذية	2	2	0	2	100
BT516	Green Chemistry	الكيمياء الخضراء	2	2	0	2	100
BT517	Introduction to Biostatistics	مقدمة في الإحصاء الحيوي	2	1	1	1	100

Total Credits = 24 Compulsory Courses + 4 Elective Courses

Course Specifications

BT501 Biochemistry

This course provides the linkage between the inanimate world of chemistry and the living world of biology.

The course explores roles of essential biological molecules in different living organisms, covering proteins, lipids and carbohydrates chemistry. It provides a systematic and methodical application of general and organic chemistry principles. Metabolic pathways are also examined.

BT502 Fermentation Technology

Introduces bioprocess principles used in large scale production of microbial cultures and their products. Topics of interest include microbial kinetics, bioreactors types and design, modes of operation and sterilization. Process variables and process control. On-line and off-line analytical instruments. Scaling up. Downstream process. Economics of fermentation processes. Bio-Process Technology for industrial production of metabolites, recombinant vaccines, therapeutic proteins, antibiotics and fuel.

Practical Course: Students will grow microorganisms for production of some important biotechnological products (e.g. recombinant protein). During the cultivation, the student will monitor and control several vital parameters. Also the student will follow the changes in cell growth and product formation using some analytical skills as pH and spectrophotometric measurements.

BT503 Immunology

This course is designed to provide students with a comprehensive background in immunology and immunochemistry in biotechnology. Topics range from antibodies as tools in Over-The-Counter and research immunoassays to genetic and molecular modifications of cells reactive in cancer immunotherapy. The immunological and immunochemical basis for these applications are stressed.

Practical Course: ELISA, blood grouping. Flow cytometry principle and interpretation of data. Theory beyond ELISpot, immunoblot and dot blot. CBC interpretation.

BT504 Microbiology

This course aims to refresh knowledge of microorganisms via studying the following: Ultrastructure of a bacterial cell, fungal cell and virus. Types of culture media. Growth of microorganisms (phases, nutrients, oxygen requirements, pH)). Microbial metabolism. Applications of different microorganisms in Biotechnology.

Practical Course: emphasizes on good laboratory techniques in the handling, manipulation, staining and identification of microbes.

BT505 Principles of Molecular Biology

Topics covered include differences between Prokaryotic and Eukaryotic cells and the central dogma of molecular biology. Gene expression, mutations will be covered. Polymerase Chain Reaction, DNA markers and DNA fingerprinting. Relevance and use of these techniques in medicine and industry.

Practical Course: Includes practical applications for theoretical course: sample preparation and sterilization, DNA extraction, DNA elution, DNA detection, gel preparation and DNA visualization, PCR.

BT506 Proteomics

Protein sequencing, Peptide sequencing and synthesis. Methodology and techniques in protein structure prediction and analysis; expression, separation and detection, including key techniques such as western blotting spectrophotometric assay, mass spectrometry, protein crystallization and analysis of protein structure using computational approaches. Proteomics significance in Biotechnology.

Practical Course: Laboratory experiments that will be performed include liquid chromatography, gel electrophoresis, amino acid analysis, protein crystallization and enzymatic assays.

BT507 Plant Biotechnology

The course introduces students to the principles, practices and application of plant tissue culture and transformation in science, agriculture, environment and pharmaceutical industry. Also students need to become familiar with environmental safety issues.

Practical course: hands-on experience and training in representative plant

tissue culture and genetic engineering techniques. Also the student will follow the changes in plant growth and product formation using some analytical skills.

BT508 Bioinformatics

The course covers the genetic databases; the rapidly-increasing number of genome databases, including the human genome database; the sequence homology search engines and search algorithms; software for the identification of structural sequence components; and the determination of evolutionary relationships between sequences.

BT509 Concepts of Genetic Engineering

Recombinant DNA technology, basic and advanced cloning techniques, RNAi, DNA sequencing. Relevance and applications of these techniques in medicine and industry.

Practical Course:- Includes practical application for theoretical course: preparation of competent cells, transformation techniques, cloning strategies using RE ligases, test for successful cloning.

BT5010 Applications of nanomaterials in biotechnology

Nanobiotechnology is an interdisciplinary field that exploits the unique functional properties of natural and synthetic biomolecular-sized (nanometer-scale) constructs such as quantum dots, carbon nanotubes, nanostructured surfaces, liposomes, artificial membranes, and molecular machines for biotechnology. This course will survey the applications of nanotechnology to medical diagnostics, imaging, and therapeutics (including drug delivery and anticancer treatments); nanofluidics, bioassays, biosensors, and bio-inspired engineering. Also, applications of nanotechnology in different environmental aspects will be discussed.

Practical Course:- includes different nanomaterial preparation, characterization and some applications in biotechnology.

BT511 Instrumentation and lab safety

Bio-ethics, lab management and how to deal with biological hazards. Centrifugation Techniques: Principles, type of centrifuges, and applications in isolation of cells, cell organelles and biomolecules. Chromatographic Techniques: Principles, types and applications in biotechnology. Electrophoretic techniques: Proteins, Carbohydrates and Nucleic Acids. Spectroscopic Techniques: Principles, types and applications in biotechnology.

BT512 Modern Applications of Biotechnology

Applications of modern biotechnology in health, medicine and environment, and safety in biotechnology. Advanced topics in biotechnology will be covered such as stem cells, vaccinology, transplantation, marine biotechnology, and applications of biotechnology in renewable energy and water treatment.

BT513 Bioassay Development

This course will cover methodological approaches to bioassay development for high throughput screening. Both cell-based (cytotoxicity; cytoprotection, high content imaging, and reporter systems) and cell-free assay systems (enzyme, FRET, time resolved fluorescence, quenching assays, immunological assays) will be included with discussion of the potential promise and pitfalls associated with each assay system. Various assay formats, visualization techniques, and current developments in assay technology will be discussed. Project management techniques will be utilized to aid in the process of assay development.

BT514 Biochemical Engineering

Microbial Growth Kinetics: Thermodynamic principles, Stationary cell growth, Growth yield, Specific growth rate, Product yield, Saturation constant, Biomass energetics, Yield equations. Scale-up Studies: Criteria for translation between two scales of operation, Non-geometric scale-up. Mass Transfer in Microbial System: Fluids and its properties, Non-

Newtonian fluids, Gas–liquid mass transfer, Oxygen transfer and utilization in gassed microbial system, mass transfer resistances, and heat transfer coefficient correlations.

Practical Course: Includes practical application for theoretical course: stoichiometry, kinetic reactions, enzyme kinetics, fluid flow and mixing.

BT515 Food biotechnology

The topics cover food ingredients, FDA regulations, rapid detection techniques of foodborne pathogens, chemical senses, nutrigenomics and nutraceuticals.

BT516 Green Chemistry

This course helps students understand the notion of sustainability and how it applies to chemistry. It also explores the history of chemistry, outlines critical need for green chemistry, and the principles that guide its practice as an emerging and important field of science.

BT517 Introduction to Biostatistics

Statistical methods and reasoning, with an emphasis on the techniques and terms commonly encountered in research, are presented as tools for students to determine the impact of research on practice, especially in the areas of probability and statistical inference. Statistical software is used extensively to simplify statistical calculations.

دبلوم الكيمياء الحيوية الطبية

Diploma of Biomedical Chemistry

Courses

1. First Semester:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
MC501	Immunology	المناعة	2	1	1	1	100
MC502	Clinical Chemistry (I)	الكيمياء الاكلينيكية (I)	2	1	1	1	100
MC503	Molecular diagnostics	التشخيص الجزيئي	3	2	1	2	150
MC504	Basic Microbiology	أساسيات الميكروبيولوجي (علم الأحياء الدقيقة)	2	1	1	1	100
MC505	Hematology	أمراض الدم	3	2	1	2	150

2. Second Semester:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
MC506	Forensic chemistry	كيمياء الطب الشرعي	2	1	1	1	100
MC507	Fundamental pathology and Histopathological techniques	أساسيات علم الأمراض والتقنيات النسيجية	3	2	1	2	150
MC508	Clinical Chemistry (II)	الكيمياء الاكلينيكية (II)	2	1	1	2	100
MC509	Laboratory	إدارة	2	2	0	2	100

	Management & Quality Assurance	المختبرات وتوكيد الجودة					
MC510	Medical Microbiology	الميكروبيولوجيا الطبية	2	1	1	2	100
MC511	Physiology	علم الفسيولوجي	1	1	0	1	50

Elective Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
MC512	Instrumental analysis	التحليل الآلي	2	2	0	2	100
MC513	DNA Technology	تقنيات الحمض النووي	2	1	1	1	100
MC514	Blood Banking	بنك الدم	2	1	1	1	100
MC515	Occupational Safety & Health	السلامة والصحة المهنية	2	2	0	2	100
MC516	Radiobiology	البيولوجيا الإشعاعية	1	1	0	1	50
MC517	Cell biology	بيولوجيا الخلية	1	1	0	1	50
MC518	Tumor Biology	بيولوجيا الأورام	1	1	0	1	50
MC519	Fundamentals of ISO 15189 & 17025	أساسيات الأيزو	1	1	0	1	50
MC520	Fundamentals of Nanoscience	أساسيات علم النانو	2	2	0	2	100
MC521	Clinical Pathology	الباثولوجيا الأكلينيكية	2	2	0	2	100
MC 522	Major project	مشروع بحثي	2	2	0	2	100

Total Credits = 24 Compulsory Courses + 4 Elective Courses

Course Specifications

MC501 Immunology

This subject covers the knowledge of all systems in the human body with more focus on the immune system. It introduces common terms, concepts, fundamental procedures and applications used in immunology.

Practical Course: Theory beyond ELISpot, immunoblot and dot blot. CBC interpretation.

MC502 Clinical chemistry I

Provides the basic knowledge concerning the properties of carbohydrates, lipids and proteins, and their significance in biological systems. It will initially introduce the common and basic bioreactions occur within the human body. It aims to provide an overview of metabolism and emphasizes the relationship between anabolism and catabolism, and their role in maintaining life.

Practical: Estimate serum levels of glucose, total proteins, albumin, cholesterol, creatinine and uric acid by colorimetric methods.

MC 503 Molecular diagnostics

Provides you with the basic theoretical and practical knowledge of Molecular Biology. Topics include the molecular biology techniques, gene regulation in eukaryotes, eukaryotic viruses, genetics and cancer. Essential techniques for the advanced molecular diagnostics and kits.

Practical Course: sample preparation and sterilization, DNA extraction, DNA elution, DNA detection, gel preparation & DNA visualization, PCR.

MC 504 Basic Microbiology

Basic Microbiology Overview of the microbial world including a survey of the structure, function, and diversity of microorganisms. Introduction to the concepts of microbial physiology.

Practical:

Lab precautions, agar preparation, bacterial culture, growth curve, identification

MC 505 Hematology

Provides the theoretical foundation and practical skills in hematology. It covers the structure and function of all blood components. Discusses the normal development of the blood components and correlates common blood disorders. It also covers laboratory investigations of anemia, hemoglobinopathies, thalassemia, hemostasis, blood parasites and hematopoietic stem cell disorders.

Practical:

Blood samples preservation, C.B.C, differential C.B.C

MC506 Forensic chemistry

Application of forensic science such as in fingerprinting development, explosives, narcotics, drugs and other areas and their practical applications.

MC507 Fundamental pathology and Histopathological techniques

Provides an introduction to the mechanisms and progression of diseases and to the morphology, molecular, cellular, tissue, and organ changes. Topics include cellular adaptations and tissue damage (degeneration and cell death), inflammation, healing and repair, hemodynamic disorders, tumorigenesis and organ pathologies. At the end of the module, students will have built the foundation of understanding of the pathogenesis of diseases and the interpretation. Provides the practical foundation in techniques based on histopathology. Emphasis is given to the ability to apply theory to bench practice in tissue fixation and processing, staining (routine and special stains), immunohistochemistry and instrumentation. Cryotomy and exfoliative cytology are also introduced.

Practical:

histopathology. Emphasis is given to the ability to apply theory to bench practice in tissue fixation and processing, staining (routine and special stains), immunohistochemistry and instrumentation. Cryotomy and exfoliative cytology are also introduced.

MC 508 Clinical Chemistry II

Skills the candidate with all essential knowledge to understand of pathophysiological changes in disease. Provides the tools and concepts in clinical chemistry for diagnosis, prognosis, monitoring and screening of disease. Empower the ability to link the purpose and limitations of specific laboratory tests to the theoretical knowledge and understanding of clinical chemistry. It also provides you with the basic skills and understanding in laboratory tests carried out in the clinical chemistry laboratory.

Practical: Advanced clinical tests.

- Protein estimation in body fluids.
- Protein Separation methods.
- Hormones investigations by ELISA.
- Complete Urine analysis.

MC 509 Laboratory Management & Quality Assurance

This subject covers basic principles and techniques of laboratory safety, and management as well as quality assurance, risk assessment and management. Provides proper framework of good laboratory practices and total quality management.

MC 510 Medical Microbiology

This course will provide the basic fundamentals of clinical microbiology including public health, diagnostic testing, pharmaceutical sales, and basic research and development. Discussion will focus on academic and professional requirements for each career track. This will also include laboratory management, infection control, diagnostic techniques.

MC 511 Physiology

This subject covers the knowledge of physiology of all systems in the body. It introduces common terms, concepts, fundamental procedures and applications used in physiology.

MC 512 Instrumental analysis

To provide the students with a comprehensive theoretical background for the most useful and modern instrumental analysis methods and techniques. Some useful recent applications will be also discussed.

MC 513 DNA Technology

Structure, function and synthesis of DNA, RNA and proteins. Roles of macromolecules in the regulation of information in the cell. Isolation and manipulation of nucleic acids, construction of recombinant DNA and transformation of cells.

Practical Course: Includes practical application for theoretical course.

Practical: ELIZA system, and some immunoassay tests.

MC 514 Blood Banking

This subject provides the basic knowledge of blood banking and covers the theoretical, practical and clinical aspects of blood transfusion. There is emphasis on the application of immunologic principles as applied to blood grouping, tissue typing and compatibility testing. It also stresses the importance of laboratory quality control and clinical considerations in transfusion practices.

Practical: blood transfusion test and precautions, blood grouping, tissue typing and compatibility testing.

MC515 Occupational Safety & Health

Covers health issues and safety at the workplace. The section on health examines the causes of occupational diseases and their respective controls (heat stress/strain, ventilation, noise and industrial lighting). The section on safety explores topics like machinery safety, electrical safety, hazards of fire and explosion, housekeeping and material handling, personal protection equipment and legislation concerning occupational safety and health.

MC 516 Radiobiology

The course describes the effects of ionizing radiation on living organisms, from cells to animals. The lectures begin with a brief physical description of the various types of ionizing radiation, the electromagnetic spectrum, and how radiation interacts with atoms. The early physical events produce ionizations and yield chemical radicals that can damage important biological molecules such as water and

DNA, leading to either cellular repair or death. The course emphasizes radiation damage to cells and organs, with practical illustrations of applications to cancer therapy. It also reviews the risk-benefit rationale used in government regulations for the controlled use of radiation in research and medicine.

MC 517 Cell Biology

This subject covers the biology of cells of higher organisms: structure-function relationships of cellular membranes and internal organelles, cell cycle and cell division; transport mechanisms and cell communication, cell motility and the cytoskeleton and cell death. Provide the basic practical fundamentals required for biology and molecular labs.

MC 518 Tumor Biology

This course will provide a comprehensive overview of the biology and pathology of cancer. The first half of the course will focus on the genetic and molecular basis of cancer. We will explore the role of mutations in cancer cells and how they lead to the deregulation of essential biological properties such as programmed cell death, cell proliferation, and differentiation. The second half of the course will focus on the interface of cancer and medicine. Classical treatment methods will be compared with newer treatment modalities, such as targeted therapies. We will also explore the challenges associated with diagnosing cancers, as well as ways in which to prevent cancer.

MC519 Fundamentals of ISO 15189 & 17025

Equip the candidates with all essential fundamentals in how to implement a quality management in a lab, provide the knowledge of the major managerial and technical requirements for lab accreditation, increase the skills of the good laboratory practices.

MC520 Fundamentals of Nanoscience

Introduction to nanoscience – definition of nanomaterials and nanoscale. Preparation methods of nanostructures including up-down and bottom-up techniques. Selected industrial applications of nanomaterials.

MC521 Clinical Pathology

Clinical pathology assists in disease diagnoses, based on observed changes in tissue structure or biochemistry, while the focus of investigative pathology is the elucidation of the underlying mechanisms related to tissue injury and disease processes.

MC522 Major Project

This subject provides a framework for student to solve practical problems, conduct research work and/or develop studies, through a self-managed project.

Diploma of Environmental Science and Industrial development

Courses

1. First Semester:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
EN501	Environmental chemistry and analysis	التحليل الكيميائي والبيئي	3	2	1	2	150
EN502	Ecology	علم البيئة	3	2	1	2	150
EN503	Fundamentals of Air Pollution Control	أساسيات التحكم في تلوث الهواء	3	2	1	2	150
EN504	Environmental Economics	اقتصاد بيئي	1	1	0	1	50
EN505	Clean Water Technology	تكنولوجيا المياه النظيفة	1	1	0	1	50
EN506	Solid and Hazardous Waste Management	ادارة المخلفات الصلبة والخطرة	2	2	0	2	100
EN507	Plant design	تصميم مصنع	1	1	0	1	50

2. Second Semester:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
EN511	Water	تكنولوجيا	1	1	0	1	50

	Reclamation Technology	تجميع المياه					
EN512	Environmental Legislative Framework and Methods of Enforcement	أساسيات التشريعات البيئية وطرق العقوبات	1	1	0	1	50
EN513	Workplace safety and health	السلامة و الصحة المهنية	1	1	0	1	50
EN514	Fundamentals of Oilfield Processing	أساسيات تجهيز حقول النفط	2	2	0	2	100
EN515	Environmental management system	نظام الإدارة البيئية	1	1	0	1	50
EN516	Industrial wastewater technology	تكنولوجيا مياه الصرف الصناعي	1	1	0	1	50
EN517	Practical environmental analysis	مقرر عملي تحليل بيئي	3	2	1	2	150

Elective Courses

Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
EN508	Membrane science and technology	علوم وتكنولوجيا الأغشية	2	2	0	2	100
EN509	Basic hydraulic	الهيدروليكية الأساسية	2	2	0	2	100
EN510	Risk Management	إدارة المخاطر	2	2	0	2	100
EN518	Basics of nano	أساسيات علم النانو	2	2	0	2	100

	technology						
EN519	Energy conservation management	ادارة الحفاظ على الطاقة	2	2	0	2	100
EN520	Process instrumentation and control	الاجهزة العملية والتحكم	2	2	0	2	100

Total Credits = 24 Compulsory Courses + 4 Elective Courses

Course Specifications

EN501 Environmental Chemistry and Analysis

This course introduces graduates to the field of environmental chemistry and provides a foundation for applications in pollution control and water & wastewater technology. Graduates will study the practical aspects of environmental chemistry, quantitative measurements and analysis of air, water and wastewater. Principles of measurement, instrumentation and analysis are emphasized using an application-oriented approach.

EN502 Ecology

Ecology is the study of living things in their natural environment. This module focuses on the significance and function of natural ecosystems, and how humans have affected these systems over time. It concentrates on the interaction between human activities, resources, and the environment. As the human population grows and technology advances, pressures on earth's natural systems are becoming increasingly intense and complex. This module aims to promote greater environmental awareness and nurture social responsibility towards the environment.

EN503 Fundamentals of Air Pollution Control

Introduction to air pollution. Chemistry of air pollution. Effects of air pollution. Air pollutants from industrial processes. Transport of air pollutants. Indoor air pollution. Air pollution measurements and analytical techniques. Air pollution laws and regulations, and the

emission standards. Air pollutant concentration models. Air pollution control. Future of air pollution.

EN504 Environmental Economics

This course aims at equipping students with economic methods and tools to analyze basic environmental issues while strengthening group work skills. This course combines theoretical analysis with discussions on specific environmental policies as applied to water, air pollution, energy, climate change and human health issues. Within these examples, particular topics that will be covered are the concepts of sustainability, microeconomic analysis of environmental regulation, the problem of social cost, policy instrument choice, and estimating costs and benefits of environmental improvements via revealed preferences (hedonic analysis, travel cost method, household production) or stated preferences.

EN505 Clean Water Technology

This module introduces the processes for treating raw water from various surface water sources to produce potable water. Graduates will study raw water quality parameters, treatment techniques, and the monitoring and operation of water treatment systems. The focus is on conventional water treatment technologies emphasizing on chemical coagulation and flocculation processes for removal of suspended and colloidal solids in raw water. Topics covered include pre-treatment of raw water, sedimentation, coagulation, flocculation, filtration and disinfection techniques.

EN506 Solid and Hazardous Waste Management

Graduates will examine how solid and hazardous waste is generated; the pollution problems related to waste disposal; and methods of collection, handling, treatment and disposal of waste. Concepts of waste minimization such as recycling, reusing, reducing and waste exchange will be highlighted as effective tools in waste management. Issues in biomedical waste generation, collection and treatment will be addressed. Local legislation for solid and hazardous waste will be explained in relation to the overall waste management practice.

EN507 Plant Design

A study of the engineering aspects involved in the development of an industrial plant. Capital and manufacturing cost estimates. Safety in design. Feasibility survey. Equipment design and specification. Plant layout and location. Students will work in small groups to produce a process design and economic evaluation of a complete industrial plant.

The students will learn:

- Plant layout fundamentals and work flow procedures
- Terminology and symbols used in plant layout
- Fundamental principles of chemical process technology
- Process flow diagrams (PFDs)
- Equipment used in process plants
- Instrument symbols and abbreviations
- Piping and instrumentation diagrams (P&IDs)
- Piping design and engineering principles
- Terminology, symbols and abbreviations used in piping design
- Piping specifications and piping codes
- Components of piping systems - fittings, flanges and valves
- Piping isometrics and bill of materials.

EN508 Membrane Science and Technology

This module aims to equip graduates with fundamental knowledge of membrane science and membrane applications in environmental engineering. Topics covered in this module include the types of membranes and membrane modules, the basic principles of membrane fabrication, general theory of membrane transport, membrane separation process, membrane fouling, liquid membranes, and facilitated transport. Membrane applications in water reclamation recycling and reuse will also be covered.

EN509 Basic Hydraulic

Graduates will examine the basic hydraulic principles and fundamental concepts that are essential for the study of water and wastewater technologies. Topics covered include the properties of fluid, manometry, hydrostatics and fundamental principles of fluid flow. Head loss in pipeline, design of pipeline, flow measurements and pipe

network analysis will also be covered. Graduates will also learn about open channel flow and the design of surface water drainage system.

EN510 Risk Management

What is risk management? Why accidents occur. How to avoid accidents. The consequences. Personnel health and safety. Process safety analysis. Loss prevention. Process safety in design and operations. Defining and quantifying risk. Checklists. Hazard and operability analysis (HAZOP) studies. Hazard analysis (HAZAN) techniques. Human factors. Linking HAZOP, process control, instrumentation and alarm systems. Cost of plant safety. Environmental impact. Case studies of serious plant accidents.

EN511 Water Reclamation Technology

Graduates will explore the fundamentals of collection systems for wastewater from domestic premises, wastewater treatment techniques, monitoring and operation of wastewater treatment systems, and the code of practice relevant to sewerage and sewage treatment. The design of sewer collection systems will also be covered in detail. Emerging technologies in water reclamation and water recycling will be emphasized in this module

EN512 Environmental Legislative Framework and Methods of Enforcement

Structural: Bridges roads towers power pylons -Transportation: Roads traffic control airports -Water: Dams pipelines purification works reservoirs -Geotechnical: Foundations excavations and fills-Urban: Municipal services development and maintenance of towns -recreational facilities -Construction: Construction management-Environmental: Impact studies social and natural environments harmonising affected elements and resources.

EN513 Workplace Safety and Health

This module focuses on the study of various aspects that are critical to the provision of a safe working environment. Topics covered include toxicology, clean air and ventilation, control of temperature and humidity, industrial hygiene and industrial diseases.

EN514 Fundamentals of Oilfield Processing

Introduction to Oilfield Processing. Measurement. Instrumentation. Relief systems. Storage. Multiphase flow calculations in pipe lines. Separator design and sizing of flow lines. Pumps and Hydraulic Turbines. Hydrate formation and remedial options. Prime mover for mechanical drive. Hydrocarbon Recovery. Utilities in upstream processing. Dehydration and hydrocarbon treating. Compressors, Expanders and Refrigerators. Utilities in upstream processing. Dehydration and hydrocarbon treating.

EN515 Environmental Management System

In this course, graduates will learn the application of concepts and principles in environmental management. Topics covered include the fundamentals of environmental impact assessment (EIA), environmental baseline studies (EBS), risk assessment, environmental management systems (EMS), ISO 14001, OSHA 18001 and environmental auditing.

EN516 Industrial Wastewater Technology

Different industrial processes result in unique type and characteristics of industrial wastewater. Considering specific pollutants and toxic substances, treatment methodology applicable for conventional domestic wastewater is not all together applicable for industrial wastewater. This module introduces graduates to specific industrial wastewater problems and addresses possible unit processes applicable to industrial wastewater treatment. These unit processes, along with conventional water pollution treatment techniques, can then be applied as a complete treatment flow for different industrial wastewater types. The module will cover basic physical, chemical and biological treatment technologies and also highlight specific industrial wastewater treatment methods and anaerobic treatment applications.

EN517 Practical environmental analysis

- Classical analysis
- Water analysis
- Cement analysis
- Instrumental analysis

EN518 Basics of nano technology

Introduction to nanoscience – definition of nanomaterials and nanoscale – preparation methods – characterization and application.

EN519 Energy conservation management

Energy consumption is at an all-time high, and it is uncertain how high energy costs will go. This module will teach graduates energy conservation efforts and innovative programs to help people, including businesses, get in the habit of using energy more efficiently, thereby saving money, energy and the environment.

EN520 Process instrumentation and control

Graduates will study the principles and applications of process instruments and the fundamentals of automatic process control systems, which include the basic concepts of analogue and digital control, principles of feedback and loop stability. The module includes a site visit to a control plant to enhance student learning.

دبلوم كيمياء وتكنولوجيا صناعة الأسمنت

Diploma of Cement Chemistry and Technology

Courses

1. First Semester:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
CT501	Environmental Impact Assessment of Cement Industrial	تقييم الأثر البيئي لصناعة الاسمنت	2	2	0	2	100
CT502	Health, Safety & Environmental Management	الصحة والسلامة و الإدارة البيئية	2	2	0	2	100
CT503	Fundamentals of Air Pollution Control	أساسيات التحكم في تلوث الهواء	3	2	1	2	150
CT504	Instrumental Analysis	تحليل أجهزة	3	2	1	2	100
CT505	Kiln Process Operation and Control	التشغيل والتحكم في الفرن	2	2	0	2	100
CT506	Chemistry and Production of Cement	كيمياء و انتاج الاسمنت	1	1	0	1	50
CT507	Industrial waste	مخلفات صناعية	1	1	0	1	50

2. Second Semester:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
CT511	Cement Plant Instrumentation and control	أجهزة وتحكم مصنع الأسمنت	1	1	0	1	50
CT512	Cement and Environmental effect	الاسمنت و الأثر البيئي	3	2	1	2	1500
CT513	Dedusting Equipment and cement standards	أجهزة إزالة الغبار و معايير الاسمنت	1	1	0	1	50
CT514	Environmental Legislative Framework and Methods of Enforcement	الإطار التشريعي البيئي وطرق تنفيذ	1	1	0	1	50
CT515	Mining, Mineral Processing and Cement	تعددين ومعالجة المعادن والأسمنت	2	2	0	2	100
CT516	Principles of Environmental Risk Management	اساسيات إدارة المخاطر البيئية	2	2	0	2	100

Elective Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
CT508	Civil Liability in Relation to	المسؤولية المدنية الخاصة	2	2	0	2	100

	Environmental Pollution	بالتلوث البيئي					
CT509	Environmental civil engineering	الهندسة المدنية البيئية	2	2	0	2	100
CT510	Economic of cement	اقتصاد الاسمنت	2	2	0	2	100
CT517	Energy conservation management	إدارة توفير الطاقة	2	2	0	2	100
CT518	Monitoring and operation of wastewater treatment	رصد وعملية معالجة مياه الصرف	2	2	0	2	100

Total Credits = 24 Compulsory Courses + 4 Elective Courses

Course Specifications

CT501 Environmental Impact Assessment of Cement Industrial

The EIA process should proceed through a number of steps:

- Description of the project: What type of projects, its size, components, and processes expected, all stages of implementation?
- Screening: is an EIA required?
- Scoping, or identification of potential environmental impacts: What has to be covered in the formal EIA and in what detail?
- Baseline: What are the existing environmental conditions? - Prediction: What environmental impacts will the project have? - Evaluation: How will these impacts affect people and resources, and how significant are the resulting effects?
- Mitigation: Can significant negative effects be avoided or made acceptable?

CT502 Health, Safety & Environmental Management

Criteria for evaluating the significance of impacts, Health, Safety & Environmental Management and their effects should be set in advance. They should be based on local standards wherever possible. Where these are not available, acceptable international standards should be used (e.g. WHO, US EPA, etc. guidelines).

CT503 Fundamentals of Air Pollution Control

Air pollutants. -Effects on human beings and environ. Sources of air pollutants - Pollutant concentration and emission – measurements - Chemistry in the atmosphere. Dispersion of pollutants in the atmosphere - Regulations and laws - General Ideas in Air Pollution Control-A better process design-After-treatment processes - Alternative approaches - Control mechanisms. Size distributions - Wall collection devices - Dividing collection devices - Gas control –Incineration-Regional and Global Issues-Global warming - Stratospheric ozone depletion. Acid rain.-Long-range transport-Hazardous air pollution-Urban smog-Indoor air pollution.

CT504 Instrumental Analysis

Introduction to Instrumental analysis-Radiation and Bioradiation-IR, UV, NMR, MS, and electronic microscope (Scanning and transmittance) –electrophoresis –spectrophotometer and HPLC devices

CT505 Kiln Process Operation and Control

The Course contents: Process and kiln system, Basic principles of operation. Chemical Reactions in the Kiln. Kiln Zones, Raw Material characteristics. Liquid Phase and importance of Iron and Aluminum content, Fuel types and their characteristics, Combustion Theory, Calciner Operation, Calciner Fuels, Heat Balances. Heat Balance work session, Optimization of heat consumption, Behavior of volatile matter. Volatile matter work session, Clinker coolers, Operations and optimization of clinker coolers, Emissions of NO_x and SO_x from cement kilns. New emission standards, Starting and Stopping the kiln.

CT506 Chemistry and Production of Cement

The production of cement takes place with several steps:

- Quarrying of limestone and shale
- Dredging the ocean floor for shells
- Digging for clay and marl
- Grinding, Blending of components
- Fine grinding, Burning, Finish grinding, Packaging and/or shipping.

CT507 Industrial waste

The aim of the course is to study wastes from industries, characterization of waste stream, management of industrial wastewater, source reduction, treatment and disposal of solid wastes, methods for treating air discharges and the technologies for waste treatment. Provide the student with the skills required for management of industrial waste.

CT508 Civil Liability in Relation to Environmental Pollution

Civil liability resulting from environmental damage: an international and comparative law overview- Technical and scientific co-operation - National substantive law: overview of the principal judicial means for obtaining reparation for damage resulting from environmental pollution in common law and in civil law -The conflict of laws in the field of environmental liability- Legislative cooperation -The environmental disaster: a mass tort litigation.

CT509 Environmental civil engineering

Structural: Bridges roads towers power pylons-Transportation: Roads traffic control airports-Water: Dams pipelines purification works reservoirs-Geotechnical: Foundations excavations and fills-Urban: Municipal services development and maintenance of towns - recreational facilities-Construction: Construction management-Environmental: Impact studies social and natural environments harmonising affected elements and resources.

CT510 Economic of Cement

Feasibility studies, cash flow, balance sheet, return on investment, decision making, opportunity cost, interest rate to review the future money value, currency exchange

CT511 Cement Plant Instrumentation and Control

Graduates will study the principles and applications of process instruments and introduction to Instrumental Analysis-Radiation and Bioradiation-IR, UV, NMR, MS, and electronic microscope (Scanning and transmittance) –electrophoresis –spectrophotometer and HPLC devices. Software control, control room operation, auto pilot (expert optimizer, other simulation programs) flow meters, weight feeders calibration, belt scales.

CT512 Cement and Environmental Effect

Description of the cement industry- Pressures on the environment- Resource use- Emissions to air- Discharges to water- Waste production and management- Transport- Pollution incidents and prosecutions- Noise, vibration, odor and aesthetics- Standards of environmental management- Environmental Impacts.

CT513 Dedusting Equipment and Cement Standards

The main sources of dust emissions in the cement industry. Sources of emissions in particular disorganized emissions also include all sorts of feeding devices, packaging installations and silos. Type of technological installation, types of equipment used for dedusting in the cement industry. Electro filters and, Bag (fabric) filters. Cement standards according to (Egyptian standards 1-4756/2007).

CT514 Environmental Legislative Framework and Methods of Enforcement

Principles of health and safety management. Loss causation and incident investigation. Identifying hazards. Assessing and evaluating risk. Risk control and emergency planning. Organizational factors. Human factors. Principles of health and safety law. Criminal law. Civil law. Measuring health and safety performance. General aspects of occupational health and hygiene. Principles of toxicology and epidemiology. Evaluating risk from chemical agents. Preventive and

protective measures concerning hazardous substances.

CT515 Mining, Mineral Processing and Cement

Mine-Wide Optimization: Extraction ,Transportation and Conveyance, -Crushing and grinding, -Different quarries with simple geological basis knowledge and quarry managements

CT516 Principles of Environmental Risk Management

Concepts and principles underpinning Environmental Risk Assessment and Management, including aspects such as Hazard, Harm, Risk, Pollution, etc., in the context of the principles of Sustainability.-Understanding what ‘a risk-averse and cautious approach’ entails-Tools and Guidelines for Risk Assessment-Multi-Criteria Decision Making and Risk Management Planning-Practical Case Study – Risk Assessment for Mine Closure-Risk assessment provides a systematic procedure for predicting potential risks to human health or the environment.

CT517 Energy Conservation Management

Energy consumption is at an all-time high, and it is uncertain how high energy costs will go. This module will teach graduates energy conservation efforts and innovative programs to help people, including businesses, get in the habit of using energy more efficiently, thereby saving money, energy and the environment.

CT518 Monitoring and Operation of Wastewater Treatment

Wastewater treatment techniques, monitoring and operation of wastewater treatment systems, and the code of practice relevant to sewerage and sewage treatment. The design of sewer collection systems will also be covered in detail. Emerging technologies in water reclamation and water recycling will be emphasized in this module.

دبلوم علوم وهندسة الطاقة المتجددة

Diploma of Renewable Energy Science and Engineering

Courses

1. First Semester:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
RE501	Energy and Environment	الطاقة والبيئة	1	1	0	1	50
RE502	Energy Conversion and Storage	تحويل وتخزين الطاقة	3	2	1	2	150
RE503	Renewable Energy and Society	الطاقة المتجددة والمجتمع	1	1	0	1	50
RE504	Photovoltaic Systems Technology	تقنية النظم الكهروضوئية	3	2	1	2	150
RE505	Energy Economics and Policies	اقتصاديات وسياسيات الطاقة	1	1	0	1	50
RE506	Hydrogen Production and Storage	انتاج وتخزين الهيدروجين	3	2	1	2	150

Elective Courses*							
RE507	Power Semiconductor Converters	أشباه موصلات محولات القوى	2	2	0	2	100

RE508	Hydropower Technology	تقنية الطاقة الكهرومائية	2	2	0	2	100
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***Student must select one elective course**

2. Second Semester:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
RE509	Fuel Cells	خلايا الوقود	3	2	1	2	150
RE510	Biogas Technology	تكنولوجيا الغاز الحيوي	1	1	0	1	50
RE511	Renewable Hybrid Systems	النظم المختلطة للطاقة المتجددة	2	2	0	2	100
RE512	Design and Applications Of Photovoltaic Systems	تصميم وتطبيقات النظم الكهروضوئية	3	2	1	2	150
RE513	Materials Preparation and Characterization	إعداد وتوصيف المواد	3	2	1	2	150

Elective Courses*							
RE514	Renewable Energy Market and Commercialization	سوق الطاقة المتجددة وسبل تسويقها	2	2	0	2	100
RE515	Photochemistry	الكيمياء الضوئية	2	2	0	2	100

***Student must select one elective course**

Total Credits = 24 Compulsory Courses + 4 Elective Courses

Course Specifications

RE501 Energy and Environment

Introduction to Life Cycle Assessment (LCA) of energy technologies; calculation of carbon intensity of national energy generation systems and Greenhouse Gas (GHG) savings; and global environmental benefits of Renewable Energy Technology projects. Introduction to international climate and environmental conventions; carbon markets and clean development mechanism (CDM); Introduction to CDM Methodologies for Renewable Energy and energy efficiency projects.

RE502 Energy Conversion and Storage

Analysis of thermo-mechanical, thermo-chemical, electrochemical, and photoelectric processes and technologies of renewable energy conversion and storage systems; on-shore and off-shore energy conversion; innovative energy storage devices; energy carriers, synthesized fuels, and fuel reforming. Emphasis on advanced energy technologies, energy efficiency, systems performance, innovative grid connections, and minimizing environmental impacts. The course includes lab work for providing the students with relevant hands-on experiments.

RE503 Renewable Energy and Society

Awareness on renewable energy and its environmental and social impact on society, public participation in developing and managing renewable energy projects as well as low carbon society.

RE504 Photovoltaic Systems Technology

Introduction about renewable energy resources and the most widely utilized renewable Energy technologies. Introducing the electrical power engineering basics, in addition to the solar energy fundamentals. Following that, the PV modules fundamentals and PV systems and components will be introduced, as well as the PV performance analysis. The basic sizing principles of PV systems will be presented, as well as the most common and widely used fabrication methods.

RE505 Energy Economics and Policies

Energy Policies Development and Trends Subsidies, Incentives and Taxes; Policies for Renewable Energy Promotion; Climate Mitigation Policies and Renewable Energy; Sustainable development, Economic Decision Making of Renewable Energy Project.

RE506 Hydrogen Production and Storage

Chemical Production of hydrogen, Electrochemical Hydrogen Evolution, Solar hydrogen evolution, Partial Oxidation, Steam Reforming, Thermal Decomposition, Syngas, Shift reaction, Methanation, Hydrogen Purification, Desulfurization, CO₂ Removal, Electrolytic Hydrogen, Liquid Electrolyte Electrolyzers, Solid Polymer Electrolyte Electrolyzer, Ceramic Electrolyte Electrolyzer, Photolytic Hydrogen, Solar Photolysis. Storage of Hydrogen by Adsorption, Storage of Hydrogen in Chemical Compound, Metal/Metal oxide Hydrides, Hydrogen Storage Materials, carbon Nanofibres, Sponge Iron, Glass Microspheres, Carbon nanotubes, Aerogels. Materials selection, Catalyst Preparation including nano catalysts, Characterization of catalysts, Infrastructure and distribution of hydrogen, Economic aspects of using hydrogen, Innovation in hydrogen technology. The course includes lab work for providing the students with relevant hands-on experiments.

RE507 Power Semiconductor Converters

Semiconductor devices: Driving, snubber and protection circuits; Resonant converters; Switching D.C power supplies; Power conditioners; Applications in the fields of electrical energy utilization.

RE508 Hydropower Technology

Introduction to hydropower, status of large and small hydropower development in the MENA region and the world in terms of potential, installed capacities and on-going projects in the context of rural electrification and agriculture (run-off-river, canal fall based, dam toe, small hydropower, micro hydropower, and Pico hydropower).

RE509 Fuel Cells

Introduction to fuel cells, difference between fuel cells, batteries and other energy storage applications. Characteristics of fuel cells (energy efficiency, environmental issues, operating performance, etc.). Fuel cells basics: (thermodynamics and kinetics of electrochemical reactions, types of overpotentials, electrodes reactions in fuel cells, gas diffusion electrode, electrocatalysis, fuel cell efficiency). Fuel Cell electrode based material, catalyst material selection. Nano catalyst fabrications, Characterization of catalysts and investigation of catalyst performance. Fuel cell design and configurations, stack components, Types of Fuel Cell systems: (Phosphoric Acid Fuel Cells, Molten Carbonate Fuel Cells, Solid oxide Fuel Cells, Polymer Electrolyte Fuel Cells, Direct Methanol Fuel Cells, and Alkaline fuel cells). Fuel Cell Applications: Stationary Power Plants, Automotive Power Plants, other Applications. The course includes lab work for providing the students with relevant hands-on experiments.

RE510 Biogas Technology

Introduction to anaerobic digestion, benefits and costs of the biogas plant, Uses of biogas and digested effluent, quality assessment of digested slurry, components of a biogas system, Types and models of simple and advanced biodigesters. Household and institutional plants, biolatrines, scaling and design of biogas plants. Planning, construction, and management of biogas plants. Biogas technology and the Millennium Development Goals, developing CDM proposals focusing on anaerobic waste treatment, Field visits.

RE511 Renewable Hybrid Systems

systems that comprise renewable energy technologies, as well as renewable energy technologies with non-renewable ones, such as the PV-diesel systems. Application of Renewable Hybrid Systems in Rural Electrification, as well as introducing the concept of minigrids. An overview on the design and optimization methodologies of renewable hybrid systems will be presented, as well as some case studies from literature.

RE512 Design and Applications of Photovoltaic Systems

Introduction to photovoltaic systems and applications. The difference between standalone/off grid and grid connected/on grid system will be presented, as well as the basic design concepts of each system, comprising the manual calculations as well as the use of advanced software programs within the laboratory hours. An introduction about solar water pumping will be presented as well, in addition to an overview about other widely used application of PV systems.

RE513 Materials Preparation and Characterization

Fundamentals of nanoscience, Preparation of nanomaterials by different techniques. Structural characterization (XRD, XRF, XPS, SAX, Auger, SIMS, etc.), Electrochemical characterization (CV, EIS, E-I curves, etc.), Morphological characterization (SEM, TEM, AFM, STM, etc.), Thermal and mechanical properties, Spectroscopic characterization (UV, VIS, IR, Raman, etc.), Electrical properties and Optical properties. The course includes lab work for providing the students with relevant hands-on experiments.

RE514 Renewable Energy Market and Commercialization

Introduction to renewable energy markets and status. The concepts of marketing and sales (consumer behaviors, managing sales, marketing plans, business negotiations) and how to use them in marketing and selling renewable energy technologies.

RE515 Photochemistry

Photochemistry principles. Application of photochemistry reactions to organic synthesis. Heterogeneous photocatalysis.

دبلوم رقابة الجودة Diploma in Quality Control

Courses

1. First Semester:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
QC501	Basics of Analytical Science	اساسيات العلوم التحليلية	2	1	0	1	50
QC502	Instrumental Methods – I (Spectroscopy)	طرق التحليل الطيفي	3	2	1	2	150
QC503	Instrumental Methods – II (Electrochemistry)	طرق الكيمياء الكهربائية	3	2	1	2	150
QC504	Computer science	علوم الحاسب	3	2	1	2	150

2. Second Semester:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
QC505	Instrumental Methods -III (chromatography)	طرق التحليل اللوني الكروموتوجرافيا (في)	3	2	1	2	150
QC506	Quality Control and Quality Management	إدارة الجودة والتحكم	3	2	1	2	150
QC507	Research Project	مشروع بحثي	2	N/A	2	N/A	100

QC508	Biological and Microbiological Analyses: Elisa. PCR	التحليل البيولوجي والميكروبيولوجي	3	2	1	2	150
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Elective Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
QC509	Biochemical Analyses	التحليل الكيميائي الحيوي	3	2	1	2	150
QC510	Cement Analysis	تحليل الأسمنت	3	2	1	2	150
QC511	Environmental Analysis	التحليل البيئي	3	2	1	2	150
QC512	Food Analysis	تحليل الأغذية	3	2	1	2	150

Total Credits = 22 Compulsory Courses + 6 Elective Courses

ثانياً: درجات الماجستير

مادة (١): مجالات الدراسة و التخصصات

تمنح جامعة بنى سويف بناءً على إقتراح مجلس الكلية درجة الماجستير من خلال الدراسة بالأقسام العلمية المذكورة ويوضح في الشهادة اسم القسم العلمي (والتخصص الدقيق والفرعي ان وجد*) وعنوان الرسالة.
* التخصص الدقيق الفرعي للأقسام:

التخصصات الدقيقة الفرعية	البرامج العلمية	القسم العلمى	م
التطبيقات الطبية لعلوم النانو Medical Applications of Nanoscience		قسم علوم المواد وتكنولوجيا النانو	١
التطبيقات الزراعية لعلوم النانو Agricultural Applications of Nanoscience			
تطبيقات علوم النانو فى الهندسة Applications of Nanoscience in Engineering			
التطبيقات الحيوية لعلوم النانو Biological Applications of Nanoscience			
التطبيقات الحيوية لعلوم النانو Environmental Applications of Nanoscience			
الميكروبيولوجى Microbiology	برنامج التكنولوجيا الحيوية	قسم التكنولوجيا الحيوية وعلوم الحياة	٢
الكيمياء الحيوية Biochemistry			
المعلوماتية الحيوية Bioinformatics			

التكنولوجيا الحيوية النانومترية Nano-Biotechnology			
منتجات طبيعية Natural Products			
الميكروبيولوجيا الإكلينيكية والمناعة Clinical Microbiology and Immunology	برنامج الكيمياء الحيوية الطبية		
الكيمياء الحيوية الإكلينيكية Clinical Biochemistry			
تكنولوجيا صناعة الأسمنت Technology of Cement Industry	برنامج كيمياء وتكنولوجيا صناعة الأسمنت	قسم علوم البيئة والتنمية الصناعية	٣
كيمياء الأسمنت Cement Chemistry			
تقييم ومعالجة الملوثات البيئية Assessment and Treatment of Environmental Pollutants	برنامج علوم البيئة والتنمية الصناعية		
التكنولوجيا الحيوية البيئية Environmental Biotechnology			
تكنولوجيا المحاكاة البيئية Environmental Simulation Modelling			
إعادة استخدام وتدوير المخلفات البيئية Recycling and Reusing of Environmental Wastes			
تكنولوجيا الطاقة الشمسية Solar Energy Technology		قسم علوم وهندسة الطاقة المتجددة	٤
تكنولوجيا خلايا الوقود وأنتاج النيروجين Fuel Cells and Hydrogen Production Technology			

مادة (٢): شروط القيد

- أ. أن يكون الطالب مستوفى لشروط القيد الواردة باللائحة.
- ب. أن يتفرغ الطالب للدراسة يومين على الأقل أسبوعياً وذلك لمدة سنتين أكاديميتين .
- ت. الطلاب المتقدمون لدرجة الماجستير وحاصلون على البكالوريوس في غير التخصص المطلوب يجوز قيدهم بعد أدائهم امتحان المقررات التأهيلية التي قد يطلبها القسم المختص ولا تحتسب هذه الساعات ضمن الساعات المذكورة باللائحة.

مادة (٣): مدة الدراسة

- أ. الحد الأدنى لمنح درجة الماجستير هو سنة ميلادية من تاريخ موافقة الجامعة على التسجيل.
- ب. الحد الأقصى لمنح درجة الماجستير هو خمس سنوات ميلادية من تاريخ التسجيل مع مراعاة مدد وقف القيد ويجوز مد القيد بحد أقصى سنتين ميلادية بناءً على طلب المشرف الرئيسي وموافقة مجلس القسم المختص ولجنة الدراسات العليا والبحوث ومجلس الكلية.
- ت. يشترط لتسجيل رسالة الماجستير عدم مرور أكثر من ثلاث سنوات على اجتياز امتحانات السنة التمهيدية للماجستير.

مادة (٤): شروط منح الدرجة

- يوصي مجلس الكلية بناء على توصية مجلس القسم المختص ولجنة الدراسات العليا والبحوث منح درجة الماجستير في حالة إستيفاء الطالب للشروط الآتية:
- أ. مرور سنة ميلادية على الأقل على بدء التسجيل (موافقة مجلس الجامعة على التسجيل).
- ب. نجاح الطالب في اجتياز جميع المقررات الدراسية لتسجيل للدرجة.
- ت. نجاح الطالب في اختبار اللغة الإنجليزية مستوى (توفل) و حصوله على شهادة حضور دورة (الاقتباس العلمي) بالجامعة وذلك قبل منح الدرجة أو طبقاً لقرار الجامعة.
- ث. قبول الرسالة من لجنة الحكم والتوصية بمنح الدرجة طبقاً لللائحة.
- ج. نشر أو قبول نشر بحث في أي من المجلات الأجنبية المعتمدة الدولية.

ماجستير العلوم فى علوم المواد و تكنولوجيا النانو
**Master of Science in Materials Science and
 Nanotechnology**

Courses

1. First Semester:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
NT601	Materials Science 1	علوم المواد ١	2	2	0	2	100
NT602	Elements of crystallography	اساسيات اللبورات	1	1	0	1	50
NT603	Nano-biotechnology	التكنولوجيا الحيوية النانومترية	2	2	0	2	100
NT604	Instrumental Analysis	أجهزة التحليل	2	2	0	2	100
NT605	Modeling and simulation	النمذجة و المحاكاة	1	1	0	1	50
NT606	Fundamentals of Nanoscience	أساسيات العلوم النانومترية	2	2	0	2	100
GC601	Scientific Thinking and Writing	التفكير والكتابة العلمية	1	1	0	1	50

2. Second Semester:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					

NT608	Materials Science 2	علوم المواد 2	2	2	0	2	100
NT609	Nanotubes: Production to Application	الأنابيب النانومترية : من الإنتاج إلى التطبيقات	2	2	0	2	100
NT610	Nanomaterials for catalysis	المواد النانومترية الحفازة	2	2	0	2	100
NT611	Health and Environmental Impact of Nanotechnology	الأثر الصحي و البيئي للمواد النانومترية	2	2	0	2	100
NT612	Biomedical Applications of Nanomaterials	التطبيقات الطبية - الحيوية للمواد النانومترية	2	2	0	2	100
NT613	Materials & Nanotechnology Project	مشروع تكنولوجيا المواد والتكنولوجيا النانومترية	1	1	0	1	50

Elective Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
NT614	Nanotechnology of Engineering and Construction Materials	التكنولوجيا النانومترية وهندسة مواد التشييد و البناء	1	1	0	1	50
NT615	Good Laboratory Practices and safety	الممارسات والأمان المعملية	1	1	0	1	50

NT616	Semiconductor Nanostructures	المواد النانومترية الشبه موصلة	2	2	0	2	100
NT617	Nanoparticle and thin film technology	تكنولوجيا الطبقات الرقيقة والجزيئات النانومترية	2	2	0	2	100
NT618	Fabrication Techniques for Micro and Nano Devices	طرق تصنيع الأجهزة الميكرومترية والنانومترية	1	1	0	1	50
NT619	The Physics of Nanostructures	فيزياء المواد النانومترية	1	1	0	1	50
NT620	Microelectronics , Photonics and optoelectronics	الإلكترونيات الميكرومترية , الضوئيات والإلكترونيات الضوئية	1	1	0	1	50
NT621	Solar energy - Photovoltaics	الألواح الشمسية	2	2	0	2	100
NT622	Energy conversion and storage	تحويل و تخزين الطاقة	2	2	0	2	100

Complementary Courses (set by the department)

Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
CN 101	Physical Chemistry	الكيمياء الفيزيائية	2	2	0	2	100
CN 102	Analytical Chemistry	الكيمياء التحليلية	2	2	0	2	100
CN 103	Waves and Optics	الضوئيات والموجات	2	2	0	2	100
CN 104	Thermodynamics	الديناميكا الحرارية	2	2	0	2	100

CN 105	Surface Chemistry	كيمياء السطوح	2	2	0	2	100
CN 106	Properties of Matter	خواص المادة	2	2	0	2	100
CN 107	Selected Topics in Chemistry	مواضيع مختارة في الكيمياء	2	2	0	2	100
CN 108	Selected Topics in Physics	مواضيع مختارة في الفيزياء	2	2	0	2	100

Total Credits = 22 Compulsory Courses + 4 Elective Courses

Course Specifications

NT601 Materials Science 1

Crystal structure and symmetry-lattice imperfection in solids – Mechanical properties of solids – Creep and Fatigue of solids – Electrical and magnetic properties of solids - Classifications of magnetic materials — Types of Defects in Crystalline materials – The Production of Defects in Solids – Effect of Lattice Defects on the Physical and Mechanical Properties of Solids- Interaction of Dislocations with Point Defects.

NT602 Elements of crystallography

Elements of XRD - Neutron Diffraction - Electron diffraction - Bravais lattice - Brillouin zone - Calculations of unit cell parameters - Atomic packing parameter - Introduction to group theory – space group

NT603 Nano-biotechnology

The aim of this course is to convey a well-founded, wide-ranging basis of knowledge for developing, implementing and evaluating nanobiotechnological applications. In this way, the course graduates should find themselves in a position, where they are able to assess the manifold interrelationships and effects of these new technologies. On this basis, they will have the ability to elaborate useful applications for their own institutions on surfaces; transduction and control of materials

and information through biological interfaces; bilayers; bioelectronics; biosensors.

This module covers: interactions of biological molecules with surfaces; manipulation of bio-molecules.

NT604 Instrumental Analysis

Automated methods of analysis, overview of automatic instruments, Instrumentation, flow injection analysis, discrete automatic systems, Analysis based upon multilayer films - Thermogravimetric methods (TG), Differential thermal analysis (DTA), Differential scanning calorimetry (DSC). FTIR/FTRAMAN, Atomic Absorption, XRD, HPLC, mass spectrometry. TEM and SEM, BET, Zeta sizer.

NT605 Modeling and simulation

Introduction to Modeling and Simulation (IM/S) provides an introduction into modeling and simulation approaches, covering continuum methods (e.g. finite element analysis), atomistic simulation (e.g. molecular dynamics) as well as quantum mechanics. Atomistic and molecular simulation methods are new tools that allow one to predict functional material properties such as Young's modulus, strength, thermal properties, color, and others directly from the chemical makeup of the material by solving Schrodinger's equation (quantum mechanics). This approach is an exciting new paradigm that allows to design materials and structures from the bottom up - to make materials greener, lighter, stronger, more energy efficient, less expensive; and to produce them from abundant building blocks. These tools play an increasingly important role in modern engineering! In this subject they will get hands-on training in both the fundamentals and applications of these exciting new methods to key engineering problems.

NT606 Fundamentals of Nanoscience

Introduction to nanoscience – definition of nanomaterials and nanoscale. Preparation methods of nanostructures including up-down and bottom-up techniques. Selected industrial applications of nanomaterials.

GC601 Scientific Thinking and Writing

Scientific Planning – How to use a research engine - How to write a proposal – How to write a paper – Research ethics – Publication – social media.

NT608 Materials Science 2

The different modern theories of superconducting materials - Absorption of direct and indirect Semiconductor transitions - Optical Constants Relations - Photo and electroluminescence - Photoconductivity - Semiconductor Nanotechnology - Methods of preparations of thin films - Mechanism of film formation - Electrical Properties of thin films - Electrical and magnetic properties of superconductors- The basis of magnetism: classical and quantum mechanical points of view. Different kinds of magnetic materials. Magnetic phenomena including anisotropy, magnetostriction, domains, and magnetization dynamics. Current frontiers of nano-magnetics research including thin films and particles. Optical, data storage, and biomedical engineering applications of soft and hard magnetic materials.

NT609 Nanotubes: Production to Application

Production of nanotubes with different composition- characterization of the nanotubes using Field Emission SEM and High Resolution TEM- industrial application of the nanotubes
Selected topics in the scope of the most recent applications of nanotubes.

NT610 Nanomaterials for catalysis

Catalysis- types of catalysis (homogenous catalysis, heterogeneous catalysis, auto-catalysis)- theories of catalysis – nanomaterials for catalysis (Practical examples from industry).

NT611 Health and Environmental Impact of Nanotechnology

This course covers the environmental and health aspects of nanotechnology. It presents an overview of nanotechnology along with characterization and properties of nanomaterials. The course material covers the biotoxicity and ecotoxicity of nanomaterials. A sizable part of the course is devoted to discussions about the application of nanotechnology for environmental remediation along with discussions about fate and transport of nanomaterials. Special emphasis is given to risk assessment and risk management of nanomaterials, ethical and legal aspects of nanotechnology, and nano-industry and nano-entrepreneurship. Nanomaterials and pollution control. Waste water

treatment, Water desalination, membranes, nanomembranes and nanofilters.

NT612 Biomedical Applications of Nanomaterials

Medical applications of nanomaterials in: drug delivery – pharmaceuticals formulation – Targeting – Detecting- Imaging and cancer treatment.

NT613 Materials & Nanotechnology Project

Selecting a topic deals with nanoscience and nanotechnology and writing an essay on the topic with standard level of English language and science (may include an experimental part).

NT614 Nanotechnology of Engineering and Construction Materials

This course would cover the nanotechnology of the most widely used building materials such as concrete, asphalt, and wood. Structural design properties, including strength and durability, will be related to nanoscale considerations. Laboratory exercises will relate gross properties, such as strength and permeability, to nanoscale measurements and imaging.

NT615 Good Laboratory Practices and safety

Hazardous Chemical /Substance Spills – Fires - Weather Alerts - First Aid - Identification of Chemical Hazards - Chemical Inventories and Labeling - Personal Safety - Standard Laboratory Safety Equipment - Fire Prevention - Chemical and Hazardous Waste Identification and Disposal.

NT616 Semiconductor nanostructures

This module covers the physics and technology of semiconductor nanostructures, considering both the present status and possible future trends. It includes ultra-small and low dimensional devices (quantum wire and quantum dot lasers, single electron devices); self-assembly of semiconductor nanostructures; physical processes in semiconductor nanostructures; electronic and optical characterization techniques for semiconductor nanostructures.

NT617 Nanoparticle and thin film technology

This module will provide an understanding of methods for producing and characterizing nanoparticles and thin films of inorganic materials,

hands-on training in synthesizing nanoparticles and films, and an appreciation of their potential applications in electronic, biomedical and structural engineering.

NT618 Fabrication Techniques for Micro and Nano Devices

Deals with aspects of the technology of processing procedures involved in the fabrication of microelectronic devices and microelectromechanical systems (MEMS). Students will become familiar with various fabrication techniques used for discrete devices as well as large-scale integrated thin-film circuits. Students will also learn that MEMS are sensors and actuators that are designed using different areas of engineering disciplines and they are constructed using a microlithographically-based manufacturing process in conjunction with both semiconductor and micromachining microfabrication technologies.

NT619 The Physics of Nanostructures

Progress in the technology of nanostructure growth; space and time scales; quantum confined systems; quantum wells, coupled wells, and superlattices; quantum wires and quantum dots; electronic states; magnetic field effects; electron-phonon interaction; and quantum transport in nanostructures: Kubo formalism and Buttiker-Landau formalism; spectroscopy of quantum dots; Coulomb blockade, coupled dots, and artificial molecules; weak localization; universal conductance fluctuations; phase-breaking time; theory of open quantum systems: fluctuation-dissipation theorem; and applications to quantum transport in nanostructures.

NT620 Microelectronics, Photonics and optoelectronics

An overview of microelectronics and photonics science and technology. It provides the student who wishes to specialize in their application, physics or fabrication with the necessary knowledge of how the different aspects are interrelated. It is taught in three modules: design and applications, operation of electronic and photonic devices, fabrication and reliability. This course covers the theory, design, fabrication and applications of photonic materials and devices. After a survey of optical materials design for semiconductors, dielectrics and polymers, the course examines ray optics, electromagnetic optics and

guided wave optics; physics of light-matter interactions; and device design principles of LEDs, lasers, photodetectors, modulators, fiber and waveguide interconnects, optical filters, and photonic crystals. Device processing topics include crystal growth, substrate engineering, thin film deposition, etching and process integration for dielectric, silicon and compound semiconductor materials. The course also covers microphotonic integrated circuits and applications in telecom/datacom systems.

NT621 Solar energy- Photovoltaics

Solar energy is like wind energy an important source of sustainable and renewable energy. Therefore, learning more about technology that converts solar energy into electricity, heat and solar fuels might be a good investment. Photovoltaic (PV) devices are presented in this course as advanced semiconductor devices that deliver electricity directly from sunlight. The emphasis is on understanding the working principle of a solar cell, fabrication of solar cells, PV module construction and the design of a PV system. The student will understand the principles of the photovoltaic conversion (the conversion of light into electricity). The student will learn about the advantages, limitations and challenges of different solar cell technologies, such as crystalline silicon solar cell technology, thin film solar cell technologies and the latest novel solar cell concepts as studied on lab-scale.

Fundamentals of Photovoltaics. Photovoltaics and the Renewable Electricity Grid. Crystalline Silicon Photovoltaics. Material and Solar Cell Characterization and Modelling.

NT622 Energy conversion and storage

This course will focus on the engineering fundamentals of thermodynamics, flow and transport processes, as applied particularly in the current topics of interest such as fuel cells and other direct conversion systems, but encompassing also future forms of traditional systems. The course incorporates fundamentals, process and system's analysis tools in the broad energy area, intended to educate future leaders in the field of energy technology, and is not constrained by disciplinary boundaries or limited to a monolithic view of energy

conversion and utilization. The course will cover the underlying common principles of energy systems, and the analytical, experimental and computational tools used in their analysis, design and optimization. The course covers energy conversion, utilization and storage by introducing the common concepts and tools used in this field within a generic framework that allows students to analyze several alternative systems and determine according to fundamental principles which approach is compatible with the intended performance. The course covers indirect and direct energy conversion, energy conversion involving renewable sources (geothermal, electromagnetic and kinetic), the optimal integration of heterogeneous energy systems for hybrid operation, the production of energy carriers, like hydrogen, and synthesized fuels, the utilization of knowledge to maximize flexibility and extend the performance envelope, etc. It covers fundamental physical chemistry of energy conversion, both at the macroscopic and microscopic levels, and how these systems are engineered and integrated into functional modalities. The course will cover macroscopic and microscopic analysis of direct and indirect energy conversion in thermochemical, electrochemical, thermomechanical and other processes. Material includes chemical thermodynamics and kinetics in homogeneous and heterogeneous environment; kinetic theory and transport phenomena in energy systems, critical flow processes and how they impact performance. Applications to systems utilizing fossil fuels, hydrogen, and renewable resources, including electrochemical cells, catalysis, photovoltaics, supercritical and combined cycles. Examples form very large-scale power plants to microscale energy and propulsion devices will be used to demonstrate the approach and the future trends. The course provides advanced training on energy issues covering techniques for energy storage and chemical generation, including advanced battery design; fuel cells; hydrogen generation and storage systems; heat recovery and storage in the process industries.

CN101 Physical chemistry

The properties of gases- chemical equilibrium- phase diagrams- molecular structure- Molecular spectroscopy.

CN102 Analytical chemistry

Stoichiometric calculations- general concepts of chemical equilibrium-precipitation reactions and titrations- chromatography

CN103 Waves and optics

Mechanical vibrations and waves – electromagnetic waves – mechanics and electromagnetism - reflection, refraction, and diffraction.

CN104 Thermodynamics

The internal energy and the entropy – enthalpy – 1st and 2nd law of thermodynamics – Carnot cycle.

CN105 Surface chemistry

Surfaces and interfaces – adsorption – structure of surfaces – thermodynamics and dynamics of surfaces – catalysis by surfaces.

CN106 Properties of matter

Crystal lattices and crystal structure – properties of solids.

CN107 Selected topics in Chemistry

To be determined according to the department.

CN108 Selected topics in Physics

To be determined according to the department.

ماجستير العلوم فى التكنولوجيا الحيوية

Master of Science in Biotechnology

Courses

1. First Semester:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
BT601	Advanced Microbiology	علم الأحياء الدقيقة المتقدم	1	1	0	1	50
BT602	Bioprocess and Fermentation Technology	العمليات الحيوية وتكنولوجيا التخمير	2	2	0	2	100
BT603	Biostatistics	الإحصاء الحيوى	2	2	0	2	100
BT604	Immuno-biotechnology	التكنولوجيا الحيوية المناعية	2	2	0	2	100
BT605	Molecular Biology	علم الأحياء الجزيئى	1	1	0	1	50
BT606	Proteomics and Enzymology	البروتينات وعلم الإنزيمات	2	2	0	2	100
GC601	Scientific thinking and writing	التفكير والكتابة العلمية	1	1	0	1	50

2. Second Semester:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					

BT608	Biotechnology of Special Systems	أنظمة خاصة بالتكنولوجيا الحيوية	2	2	0	2	100
BT609	Concepts of Bioinformatics	مفاهيم المعلوماتية الحيوية	2	2	0	2	100
BT610	New Trends in Biotechnology	الاتجاهات الحديثة في التكنولوجيا الحيوية	2	2	0	2	100
BT611	Genetic Engineering	الهندسة الوراثية	2	2	0	2	100
BT612	Research proposal and development	اقتراح البحث والتطوير	2	2	0	2	100
BT613	Systematic Reviews	مراجعات منهجية	1	1	0	1	50

Elective Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
BT614	Chemical and Biochemical Engineering	الهندسة الكيميائية و الكيمياء الحيوية	2	2	0	2	100
BT615	DNA Sequencing and analysis	تسلسل وتحليل الحمض النووي	2	2	0	2	100
BT616	Molecular pharmacology and pharmacogenomics	علم الأدوية الجزيئي وعلم الصيدلة الجينية	2	2	0	2	100

BT617	Molecular Phylogenetic Techniques	تقنيات الفيلوجينية الجزيئية	2	2	0	2	100
BT618	Nanoscience in biotechnology	علم النانو في مجال التكنولوجيا الحيوية	2	2	0	2	100

Total Credits = 22 Compulsory Courses + 4 Elective Courses

Course Specifications

BT601 Advanced Microbiology

Ultrastructure of a bacterial cell, fungal cell. Microbial growth and metabolism. Virology, bacteriophage, viroids and virusoids. Applications of different microorganisms in Biotechnology.

BT602 Bioprocess and Fermentation Technology

Isolation and preservation of industrial cultures, selection, design and operation of fermenter. Aerobic respiration, Different fermentation processes; batch, fed batch and continuous culture. gas production in fermentation. Types of Bioreactors. Process variables and process control. On-line and off-line analytical instruments. Scaling up. Sterilization.

BT603 Biostatistics

Statistical methods and reasoning, with an emphasis on the techniques and terms commonly encountered in research, are presented as tools for students to determine the impact of research on practice, especially in the areas of probability and statistical inference. Statistical software is used extensively to perform and simplify statistical calculations.

BT604 Immuno-biotechnology

This course is designed to provide students with a comprehensive background in immunology and immunochemistry in biotechnology. Topics range from antibodies as tools in Over-The-Counter and research immunoassays to genetic and molecular modifications of cells reactive in cancer immunotherapy. The immunological and immunochemical basis for these applications are stressed.

BT605 Molecular Biology

Organization of gene and Chromosomes. Structure, function and synthesis of DNA. Prokaryotic and Eukaryotic DNA replication, chromosomal abnormalities. Gene mutations, Site directed mutagenesis. DNA Repair. Genetic code. Prokaryotic and eukaryotic translation (Protein biosynthesis). Apoptosis, molecular biology techniques, PCR, real time PCR, microarray.

BT606 Proteomics and Enzymology

Provides an overview on the use of proteomics in biomarker discovery for disease detection. Students will also be introduced to methodology and techniques in protein extraction, separation and detection. Proteomics significance in Biotechnology.

Classification of enzymes and enzyme kinetics. Factors affecting rate of enzymatic reactions. Enzyme Cofactors and Mechanism of Enzyme Catalysis. Regulation of Enzyme activity. Enzyme immobilization and Biotransformation

GC601 Scientific Thinking and Writing

Scientific Planning – How to use a research engine - How to write a proposal – How to write a paper – Research ethics – Publication – social media.

BT608 Biotechnology of Special Systems

Cell and tissue culture, Stem cells, Transgenic organisms, drug targeting, complex diagnostic kits, vaccinology, transplantation biotransformation, and marine biotechnology

BT609 Concepts of Bioinformatics

This course instructs students on computer analytical methods for gene identification, promoter analysis, and introductory gene expression analysis using software methods. Additionally, students are introduced to comparative genomics and proteomic analysis methods. Students will become proficient in annotating large genomic DNA sequences.

BT610 New Trends in Biotechnology

The course aims to expose students to new advanced trends in biotechnology and to a range of new and emerging technologies. Different modules like diagnostics, biofuel, renewable energy, water treatment, stem cells, transplantation, transgenic organisms and biotransformation, can be included (varies from term to term). Students will have the opportunity to apply their knowledge to propose and present solutions to emerging environmental or medical problems. This can be achieved by lectures, directed learning, open discussion, individual consultation and team based tasks.

BT611 Genetic Engineering

Recombinant DNA technology, gene cloning vectors, cloning strategies, competent cells. Selection, Screening & analysis of recombinant. DNA Sequencing. Methods of gene regulation in Eukaryotes (Antisense RNA, PNA & RNAi). Relevance and applications of these techniques in medicine and industry.

BT612 Research proposal and development

Written proposal in the form of a research grant application involving an industry partner.

BT613 Systematic Reviews

Upon successfully completing this course, students will be able to; Explain the essential steps of performing a systematic review addressing a biotechnology question, Critically appraise a published systematic review, and finally Describe the challenges associated with performing and interpreting systematic reviews

BT614 Chemical and Biochemical Engineering

Microbial Growth Kinetics: Thermodynamic principles, Stationary cell growth, Growth yield, Specific growth rate, Product yield, Saturation constant, Biomass energetics, Yield equations. Scale-up Studies: Criteria for translation between two scales of operation, Non-geometric scale-up. Mass Transfer in Microbial System: Fluids and its properties, Non-Newtonian fluids, Gas–liquid mass transfer, Oxygen transfer and utilization in gassed microbial system, mass transfer resistances, and heat transfer coefficient correlations.

BT615 DNA Sequencing and analysis

Micro-Robotics in DNA Sequencing; use of small-scale instrumentation involved in DNA sequencing. DNA Shearing Techniques for Shotgun Sequencing in Genomics; different techniques in DNA preparation. Ion-torrent technology and applications: DNA Sequencing

BT616 Molecular Pharmacology and Pharmacogenomics

Using receptor theory and molecular models, the mechanisms of drug response in body systems are explored. It is the study of the interaction between drug or neurotransmitter and receptor, the interaction between receptor and cell, and the relationship between receptors and drug design. In addition to the role of recombinant DNA technology and its use within the field

BT617 Molecular Phylogenetic Techniques

The course will concentrate on the understanding and use of a variety of computational tools designed to extract meaningful biological information from molecular sequences. Lectures will provide information on the conceptual essence of the algorithms that underlie various sequence analysis tools and the rationale behind their use. Only programs that are freely available, as either downloadable executables or as Web servers, will be used in this course.

BT618 Nanoscience in biotechnology

The aim of this course is to convey a well-founded, wide-ranging basis of knowledge for developing, implementing and evaluating nanobiotechnological applications. Course graduates will be able to assess the manifold interrelationships and effects of these

technologies. On this basis, they will have the ability to prepare nanomaterials from biological sources and be aware of its characterization and bioapplication.

ماجستير العلوم فى الكيمياء الحيوية الطبية

Master of Science in Biomedical Chemistry

Courses

1. First Semester:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
MC601	Clinical Immunology	المناعة	2	2	0	2	100
MC602	Molecular Biology	البيولوجيا الجزيئية	2	2	0	2	100
MC603	Fundamentals of Microbiology	أساسيات الميكروبيولوجي	1	1	0	1	50
MC604	Biochemistry	الكيمياء الحيوية	2	2	0	2	100
MC605	Hematology	أمراض الدم	1	1	0	1	50
MC606	Toxicology	علم السموم	1	1	0	1	50
GC601	Scientific thinking and writing	التفكير العلمي والكتابة العلمية	1	1	0	1	50

2. Second Semester:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
MC607	Clinical Chemistry	الكيمياء الاكلينيكية	2	2	0	2	100
MC608	Medical Genetics	علم الوراثة (الجينات) الطبية	2	2	0	2	100

MC609	Clinical Microbiology	الميكروبيولوجي الإكلينيكي	2	2	0	2	100
MC610	Biostatistics	الإحصاء الحيوي	2	2	0	2	100
MC611	Histopathology	الهستوباثولوجي ي (علم أمراض الأنسجة)	2	2	0	2	100
MC511	Physiology	فسيولوجي	1	1	0	1	50
MC512	Instrumental analysis	التحليل الآلي	1	1	0	1	50

Elective Courses

Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
MC612	Body fluids	سوائل الجسم	2	2	0	2	100
MC613	Applied Immunology	المناعة التطبيقية	2	2	0	2	100
MC614	Fundamentals of blood transfusion	بنك الدم	2	2	0	2	100
MC615	Cell and tissue biology	بيولوجيا الخلايا والأنسجة	2	2	0	2	100
MC506	Forensic chemistry	كيمياء الطب الشرعي	2	2	0	2	100
MC616	Research Project	مشروع بحثي	2	2	0	2	100
MC617	Biosensors	أجهزة الاستشعار الحيوية	2	2	0	2	100
MC618	Bioinformatics	المعلوماتية الحيوية	1	1	0	1	50
MC516	Radiobiology	البيولوجيا الإشعاعية	1	1	0	1	50

MC619	Process Control & Lab quality assurance	عمليات التحكم وضبط الجودة المعملية	1	1	0	1	50
MC519	Fundamentals of ISO 15189 &17025	أساسيات الأيزو	1	1	0	1	50
MC520	Fundamentals of Nanoscience	أساسيات علم النانو	2	2	0	2	100

Total Credits = 22 Compulsory Courses + 4 Elective Courses

Course Specifications

MC601 Clinical Immunology

Components of the immune system, mechanisms of humoral and cellular immunity, cells and organs which participate in immunity building, immune system related diseases and disorders (hypersensitivity, auto immune diseases), mechanisms for tissues and organ rejection. Molecular immunology, serology in the diagnosis of diseases, therapeutic uses of microbial toxins [vaccines, toxoids, monoclonal antibodies, etc.], quality assurance of immunologicals.

MC602 Molecular biology

Organization of gene and Chromosomes. Structure, function and synthesis of DNA. Prokaryotic and Eukaryotic DNA replication, Gene mutations, DNA Repair. Prokaryotic and Eukaryotic Transcription. RNA modifications. Genetic code. Prokaryotic and eukaryotic translation (Protein biosynthesis). Control of gene expression in prokaryotes and eukaryotes.

MC603 Fundamentals of microbiology

Basic Microbiology Overview of the microbial world including a survey of the structure, function, and diversity of microorganisms. Introduction to the concepts of microbial physiology.

MC604 Biochemistry

To cover the up-to-date fundamentals and aspects of Biochemistry such as understanding the physiologic and biochemical processes present in normal and abnormal states.

MC605 Hematology

Provides the theoretical foundation and practical skills in hematology. It covers the structure and function of all blood components. Discusses the normal development of the blood components and correlates common blood disorders. It also covers laboratory investigations of anemia, hemoglobinopathies, thalassemia, hemostasis, blood parasites and hematopoietic stem cell disorders.

MC606 Toxicology

The presence of toxic compounds in our ambient environment including factors, for example from food, which may modify the toxicological effect of these compounds. After an introduction to general toxicology the focus will be on specific toxicological disciplines such as neurotoxicology and immunotoxicology together with model systems and risk assessment.

GC601 Scientific Thinking and Writing

Scientific Planning – How to use a research engine - How to write a proposal – How to write a paper – Research ethics – Publication – social media.

MC607 Clinical Chemistry

At the molecular level, this course will deepen and empower the fundamentals and basic knowledge gained during the course clinical chemistry I and provides students with the basic foundation of biochemistry as related to physiology, pathology, pharmacology, disease diagnosis and treatment methods.

MC608 Medical genetics

Reviews basic genetic principles, and provides students with skills in recognizing and managing chromosomal, single gene, and multifactorial disorders.

MC609 Clinical Microbiology

This course will provide the basic fundamentals of clinical microbiology including public health, diagnostic testing, pharmaceutical sales, and basic research and development. Discussion will focus on academic and professional requirements for each career track. This will also include laboratory management, infection control, diagnostic techniques.

MC610 Biostatistics

Statistical methods and reasoning, with an emphasis on the techniques and terms commonly encountered in research, are presented as tools for students to determine the impact of research on practice.

MC611 Histopathology

Provides an introduction to the mechanisms and progression of diseases and to the morphology, molecular, cellular, tissue, and organ changes. Topics include cellular adaptations and tissue damage (degeneration and cell death), inflammation, healing and repair, hemodynamic disorders, tumorigenesis and organ pathologies. At the end of the module, students will have built the foundation of understanding of the pathogenesis of diseases and the interpretation. Provides the practical foundation in techniques based on histopathology. Emphasis is given to the ability to apply theory to bench practice in tissue fixation and processing, staining (routine and special stains), immunohistochemistry and instrumentation. Cryotomy and exfoliative cytology are also introduced.

MC511 Physiology

This course provides knowledge of physiology and all systems in the body. It introduces common terms, concepts, fundamental procedures and applications used in physiology.

MC512 Instrumental Analysis

To provide the students with a comprehensive theoretical background for the most useful and modern instrumental analysis methods and techniques. In addition, some useful recent applications will be also discussed.

MC612 Body fluids

Bone marrow. Formed elements of blood. Plasma proteins Hemoglobin: types, abnormalities, biosynthesis and catabolism. Different types of anemia and their causes. Blood volume; Hemostasis –factors, mechanism, anticoagulants. Disorders of hemostasis; Blood group; Blood transfusion and its hazards. Lymph and tissue fluids; Lymphatic organs.

MC613 Applied Immunology

This subject covers the immunopathology and immunological techniques used in screening, diagnosis and monitoring of diseases. It also deals with the way in which our immune system is manipulated for prevention and treatment of diseases through immunization, immune suppression and immune modulation.

MC614 Fundamentals of Blood Transfusion

This subject provides the basic knowledge of blood banking and covers the theoretical, practical and clinical aspects of blood transfusion. There is emphasis on the application of immunologic principles as applied to blood grouping, tissue typing and compatibility testing. It also stresses the importance of laboratory quality control and clinical considerations in transfusion practices.

MC615 Cell and Tissue Biology

This subject covers the biology of cells of higher organisms: structure-function relationships of cellular membranes and internal organelles, cell cycle and cell division; transport mechanisms and cell communication, cell motility and the cytoskeleton and cell death. Provide the basic practical fundamentals required for biology and molecular labs.

MC506 Forensic Chemistry

Application nanotechnology forensic science such as in fingerprinting development, explosives, narcotics, drugs and other areas.

MC616 Research Project

This subject provides a framework for student to solve practical problems, conduct research work and/or develop studies, through a self-managed project.

MC617 Biosensors

The interaction between the analyte in its native environment, the biochemical systems employed to measure the analyte and the physical transducers used to convert this information into electrical signals.

MC618 Bioinformatics

The role of computer sciences in biotechnology, mathematical process modeling, on-line microprocessor versus off-line manual control, programmable control.

MC516 Radiobiology

This module will describe the cellular and molecular basis of the response of cells, tissues and tumors to ionizing radiation. The biological basis of radiation damage and repair will be addressed and how this effects cellular processes such as cell survival. It will address the principles underlying the application of radiotherapy to the treatment of cancer and how radiotherapy interacts with other treatments such as chemotherapy.

MC619 Process Control & Instrumentation

Introduce the basic concepts and principles of process control and instrumentation in chemical process industries. Topics include process measuring instruments, basic concept of process control and open and closed-loop control systems. In addition, application of control systems in different aspects of chemical processes is covered.

MC519 Fundamentals of ISO 15189&17025

Equip the candidates with all essential fundamentals in how to implement a quality management in a lab, provide the knowledge of the major managerial and technical requirements for lab accreditation, increase the skills of the good laboratory practices.

MC520 Fundamentals of Nanoscience

Introduction to nanoscience – definition of nanomaterials and nanoscale. Preparation methods of nanostructures including up-down and bottom-up techniques. Selected industrial applications of nanomaterials.

ماجستير العلوم فى العلوم البيئية والتنمية الصناعية
Master of Science in Environmental Sciences and
Industrial Development

Courses

1. First Semester:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
EN601	Principles of Environmental Risk Management	أساسيات ادارة المخاطر البيئية	2	2	0	2	100
EN602	Environmental law and legislatives	القوانين والتشريعات البيئية	1	1	0	1	50
EN603	Fundamentals of Air Pollution Control	أساسيات التحكم فى تلوث الهواء	2	2	0	2	100
EN604	Ecology	علم البيئة	2	2	0	2	100
EN605	Instrumental Analysis	التحليل الآلى	1	1	0	1	50
EN606	Environmental civil engineering	الهندسة المدنية البيئية	2	2	0	2	100
GC601	Scientific thinking and writing	التفكير والكتابة العلمية	1	1	0	1	50

2. Second Semester:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
EN611	Monitoring and operation of wastewater treatment	رصد وتشغيل عملية معالجة مياه الصرف	1	1	0	1	50
EN612	Cement and Environmental effect	الاسمنت والتأثير البيئي	2	2	0	2	100
EN613	Fundamentals of Oilfield Processing	أساسيات تجهيز حقول البترول	2	2	0	2	100
EN614	Environmental Chemical Analysis	التحليل الكيميائي البيئي	1	1	0	1	50
EN615	Environmental management system	نظام الادارة البيئية	1	1	0	1	50
EN616	Industrial biotechnology	علم التقنيه الحيوية الصناعية	2	2	0	2	100
EN617	Solids and hazardous waste management	ادارة المخلفات الصلبة والخطرة	2	2	0	2	100

Elective Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
EN608	Membrane	علوم	2	2	0	2	100

	science and technology	وتكنولوجيا الاعشبية					
EN609	Basic hydraulic	الهيدروليكا الاساسية	2	2	0	2	100
EN610	Petroleum Processing	تكرير البتترول	2	2	0	2	100
EN618	Fundamental of Nano science	أساسيات علم النانو	2	2	0	2	100
EN619	Environmental statistics	الاحصاءات البيئية	2	2	0	2	100
EN620	Energy conservation management	ادارة الحفاظ على الطاقة	2	2	0	2	100
EN621	Process instrumentation and control	الاجهزة العملية و التحكم	2	2	0	2	100

Total Credits = 22 Compulsory Courses + 4 Elective Courses

Course Specifications

EN601 Principles of Environmental Risk Management

Concepts and principles underpinning Environmental Risk Assessment and Management, including aspects such as Hazard, Harm, Risk, Pollution, etc., in the context of the principles of Sustainability.- Understanding what 'a risk-averse and cautious approach' entails-Tools and Guidelines for Risk Assessment-Multi-Criteria Decision Making and Risk Management Planning-Practical Case Study – Risk Assessment for Mine Closure-Risk assessment provides a systematic procedure for predicting potential risks to human health or the environment. The aim of a chemical risk assessment is to investigate if a chemical is being used or can be used as intended without causing detrimental effects to human health.

EN602 Environmental law and legislative

Civil liability resulting from environmental damage: an international and comparative law overview- Technical and scientific co-operation. National substantive law: overview of the principal judicial means for obtaining reparation for damage resulting from environmental pollution in common law and in civil law. The conflict of laws in the field of environmental liability- Legislative cooperation. The environmental disaster: a mass tort litigation.

EN603 Fundamentals of Air Pollution Control

Air pollutants. - Effects on human's beings and environ. Sources of air pollutants- Pollutant concentration and emission –measurements- Chemistry in the atmosphere. Dispersion of pollutants in the atmosphere- Regulations and laws- General Ideas in Air Pollution Control- A better process design- After-treatment processes- Alternative approaches- Control mechanisms. Size Distributions -Wall collection devices- Dividing collection devices- Gas control – Incineration- Regional and Global Issues- Global warming- Stratospheric ozone depletion. Acid rain. - Long-range transport- Hazardous air pollution- Urban smog- Indoor air pollution.

EN604 Ecology

This module introduces graduates to the field of environmental microbiology, parasitology and epidemiology, and provides a foundation for further studies and applications in water & wastewater treatment, environmental health and environmental management. Graduates will also be taught selected topics on human biology and food-borne diseases.

EN605 Instrumental Analysis

Introduction to Instrumental analysis-Radiation and Bioradiation-IR, UV, NMR, MS, and electronic microscope (Scanning and transmittance) – electrophoresis –spectrophotometer and HPLC devices.

EN606 Environmental Civil Engineering

Structural: Bridges roads towers power pylons -Transportation: Roads traffic control airports -Water: Dams pipelines purification works reservoirs -Geotechnical: Foundations excavations and fills-Urban: Municipal services development and maintenance of towns - recreational facilities -Construction: Construction management-Environmental: Impact studies social and natural environments harmonising affected elements and resources.

GC601 Scientific Thinking and Writing

Scientific Planning – How to use a research engine - How to write a proposal – How to write a paper – Research ethics – Publication – social media.

EN608 Membrane Science and Technology

This module aims to equip graduates with fundamental knowledge of membrane science and membrane applications in environmental engineering. Topics covered in this module include the types of membranes and membrane modules, the basic principles of membrane fabrication, general theory of membrane transport, membrane separation process, membrane fouling, liquid membranes, and facilitated transport. Membrane applications in water reclamation recycling and reuse will also be covered.

EN609 Basic Hydraulic

Graduates will examine the basic hydraulic principles and fundamental concepts that are essential for the study of water and wastewater technologies. Topics covered include the properties of fluid, manometry, hydrostatics and fundamental principles of fluid flow. Head loss in pipeline, design of pipeline, flow measurements and pipe network analysis will also be covered. Graduates will also learn about open channel flow and the design of surface water drainage system.

EN610 Petroleum Processing

Formation of petroleum. Exploration and identification of petroleum-bearing structures and their evaluation. Drilling operations and their control. Design, operation and control of production wells.

Technologies for enhancing oil production from existing wells. Testing and evaluation of reservoirs. Reservoir management.

EN611 Monitoring and Operation of Wastewater Treatment

Wastewater treatment techniques, monitoring and operation of wastewater treatment systems, and the code of practice relevant to sewerage and sewage treatment. The design of sewer collection systems will also be covered in detail. Emerging technologies in water reclamation and water recycling will be emphasized in this module

EN612 Cement and Environmental Effect

Description of the cement industry- Pressures on the environment- Resource use- Emissions to air- Discharges to water- Waste production and management- Transport- Pollution incidents and prosecutions- Noise, vibration, odor and aesthetics- Standards of environmental management- Environmental Impacts.

EN613 Fundamentals of Oilfield Processing

Introduction to Oilfield Processing. Measurement. Instrumentation. Relief systems. Storage. Multiphase flow calculations in pipe lines. Separator design and sizing of flow lines. Pumps and Hydraulic Turbines. Hydrate formation and remedial options. Prime mover for mechanical drive. Hydrocarbon Recovery. Utilities in upstream processing. Dehydration and hydrocarbon treating. Compressors, Expanders and Refrigerators. Utilities in upstream processing. Dehydration and hydrocarbon treating.

EN614 Environmental Chemical Analysis

This course introduces graduates to the field of environmental chemistry and provides a foundation for applications in pollution control and water & wastewater technology. Graduates will study the practical aspects of environmental chemistry, quantitative measurements and analysis of air, water and wastewater. Principles of measurement, instrumentation and analysis are emphasized using an application-oriented approach.

EN615 Environmental Management System

In this course, graduates will learn the application of concepts and principles in environmental management. Topics covered include the fundamentals of environmental impact assessment (EIA), environmental baseline studies (EBS), risk assessment, environmental management systems (EMS), ISO 14001, OSHA 18001 and environmental auditing.

EN616 Industrial Biotechnology

The influence and application of biotechnology in aspects relating to the environment. Graduates will study five major areas: treatment of waste, treatment of already polluted sites and waterways, prevention of pollution, monitoring of pollution, and biotechnological innovations in environmental management.

EN618 Basics of Nanoscience

Introduction to nanoscience – definition of nanomaterials and nanoscale – preparation methods – characterization and application

EN619 Environmental Statistics

Applications of statistics in environmental pollution studies involving air, water, or soil monitoring; sampling designs; trend analysis; censored data. Proper sampling design and collection, analysis, and presentation of environmental data will lead to defensible interpretation and conclusions for any environmentally-based problem.

EN620 Energy Conservation Management

Energy consumption is at an all-time high, and it is uncertain how high energy costs will go. This module will teach graduates energy conservation efforts and innovative programs to help people, including businesses, get in the habit of using energy more efficiently, thereby saving money, energy and the environment.

EN621 Process Instrumentation and Control

Graduates will study the principles and applications of process instruments and the fundamentals of automatic process control systems, which include the basic concepts of analogue and digital control, principles of feedback and loop stability. The module includes a site visit to a control plant to enhance student learning.

ماجستير العلوم فى كيمياء وتكنولوجيا صناعة الاسمنت
Master of Science in Cement Chemistry and
Technology

Courses

1. First Semester:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
CT601	Chemistry and Production of Cement	كيمياء و إنتاج الاسمنت	2	2	0	2	100
CT602	Raw Material Used in Cement Industry	مواد خام صناعة الاسمنت	2	2	0	2	100
CT603	Kiln Process Operation and Types of Cement	التشغيل والتحكم فى الفرن	2	2	0	2	100
CT604	Dedusting Equipment	أجهزة إزالة الغبار	2	2	0	2	100
CT605	Cement Plant Quality Control	التحكم فى جودة مصنع الاسمنت	1	1	0	1	50
CT606	Cement Fuel and Oil Usage	استخدام الوقود والنفط فى الاسمنت	2	2	0	2	100
GC601	Scientific thinking & writing	التفكير والكتابة العلمية	1	1	0	1	50

2. Second Semester:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
CT611	Cement Plant Instrumentation and Control	أجهزة وتحكم مصنع الأسمنت	2	2	0	2	100
CT612	Cement and Environmental effect	الاسمنت و التأثير البيئي	2	2	0	2	100
CT613	Fundamentals of Air Pollution Control	أساسيات التحكم في تلوث الهواء	2	2	0	2	100
CT614	Cement final product standards types and their usage and impacts	أنواع معايير المنتج النهائي للأسمنت واستخداماتها وآثارها	2	2	0	2	100
CT615	Treatment and cement standards	معايير الأسمنت والمعالجة	1	1	0	1	50
CT616	Advances in Cement Technology	تكنولوجيا الأسمنت المتقدمة	1	1	0	1	50

Elective Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
CT608	Civil Liability in Relation to Environmental Pollution	المسؤولية المدنية الخاصة بالتلوث البيئي	2	2	0	2	100
CT609	Fundamental	أساسيات تجهيز	2	2	0	2	100

	of Oil Field Processing	حقول البترول					
CT610	Logistics	الخدمات اللوجستية	2	2	0	2	100
CT617	Environmental Chemical Analysis	التحليل الكيميائي البيئي	2	2	0	2	100
CT618	Energy conservation management	إدارة توفير الطاقة	2	2	0	2	100
CT619	Cement plant Layout and utilities	تخطيط مصنع الاسمنت والمرافق	2	2	0	2	100

Total Credits = 22 Compulsory Courses + 4 Elective Courses

Course Specifications

CT601 Chemistry and Production of Cement

The production of cement takes place with several steps:

- Quarrying of limestone and shale
- Dredging the ocean floor for shells
- Digging for clay and marl
- Grinding, Blending of components
- Fine grinding, Burning
- Finish grinding
- Packaging and/or shipping

CT602 Raw Materials Used in Cement Industry

Phases after firing, setting and hardening of cement paste after hydration with water. Different quarries with simple geological basis knowledge and quarry managements.

CT603 Kiln Process Operation and Types of Cement

- Process and kiln system
- Basic principles of operation
- Chemical Reactions in the Kiln
- Kiln Zones, Raw Material characteristics
- Blended and pozzolanic cements for aggressive water containing sulphates, chlorides, sea water. Improvement of cement to resist the aggressive attack.
- Liquid Phase and importance of Iron and Aluminum content
- Fuel types and their characteristics
- Combustion Theory, Calciner Operation
- Calciner Fuels, Heat Balances
- Heat Balance work session
- Optimization of heat consumption
- Behavior of volatile matter
- Volatile matter work session
 - Clinker coolers
- Operations and optimization of clinker coolers
- Emissions of NO_x and SO_x from cement kilns
- New emission standards
 - Starting and Stopping the kiln

CT604 Dedusting Equipment

The main sources of dust emissions in the cement industry. Sources of emissions in particular disorganized emissions also include all sorts of feeding devices, packaging installations and silos. Type of technological installation, types of equipment used for dedusting in the cement industry. Electro filters and, Bag (fabric) filters.

CT605 Cement Plant Quality Control

Graduates will study the principles and applications of process quality control systems, which include the basic concepts of analogue and digital control, principles of feedback and loop stability. The module includes a site visit to a control plant to enhance learning.

CT606 Cement Fuel and Oil Usage

Different fuel types used (heavy oil, diesel, natural gas, coal, waste material) Different hydraulic system used, lubrication oil types and usage.

GC601 Scientific Thinking and Writing

Scientific Planning – How to use a research engine - How to write a proposal – How to write a paper – Research ethics – Publication – social media.

CT608 Civil Liability in Relation to Environmental Pollution

Civil liability resulting from environmental damage: an international and comparative law overview- Technical and scientific co-operation. National substantive law: overview of the principal judicial means for obtaining reparation for damage resulting from environmental pollution in common law and in civil law. The conflict of laws in the field of environmental liability- Legislative cooperation. The environmental disaster: a mass tort litigation.

CT609 Fundamentals of Oilfield Processing

Introduction to Oilfield Processing. Measurement. Instrumentation. Relief systems. Storage. Multiphase flow calculations in pipe lines. Separator design and sizing of flow lines. Pumps and Hydraulic Turbines. Hydrate formation and remedial options. Prime mover for mechanical drive. Hydrocarbon Recovery. Utilities in upstream processing. Dehydration and hydrocarbon treating. Compressors, Expanders and Refrigerators. Utilities in upstream processing. Dehydration and hydrocarbon treating.

CT610 Logistics

Sea/Nile Ship trading for importing /exporting, harbor, trains, trucks, roads network, fleet management, customs relation.

CT611 Cement Plant Instrumentation and Control

Graduates will study the principles and applications of process instruments and introduction to Instrumental analysis-Radiation and Bioradiation-IR, UV, NMR, MS, and electronic microscope (Scanning and transmittance) –electrophoresis –spectrophotometer and HPLC.

CT612 Cement and Environmental Effect

Description of the cement industry- Pressures on the environment- Resource use- Emissions to air- Discharges to water- Waste production and management- Transport- Pollution incidents and prosecutions- Noise, vibration, odor and aesthetics- Standards of environmental management- Environmental Impacts.

CT613 Fundamentals of Air Pollution Control

Air pollutants. -Effects on human beings and environ. Sources of air Pollutants. Pollutant concentration and emission. Measurements-Chemistry in the atmosphere. Dispersion of pollutants in the atmosphere. Regulations and laws. General Ideas in Air Pollution Control-A Gas control –Incineration-Regional and Global Issues-Global warming. Stratospheric ozone depletion. Acid rain. Long-range transport. Hazardous air pollution. Urban smog-Indoor air pollution.

CT614 Cement Final Product Standards Types and their Usage And Impacts

Cement different types (ASTM, EU and difference in applications considering the ready mix techniques.

CT615 Treatment and Cement Standards

Cement different types (ASTM, EU and difference in applications considering the ready mix techniques ASTM, EU, and ES .Cement final product standards types and their usage and impacts

CT616 Advances in Cement Technology

This course focusing on most important and useful aspects of science and technology of cement. Cement chemistry including mathematical 108modeling, manufacture showing geology of limestone and other raw materials, concrete and other blends, instrumental analysis showing thermoanalytical techniques, and x-rays.

- Kiln and cooler control application
- Multi fuel control application
- Ball mill application
- Roller vertical mill application

CT617 Environmental Chemical Analysis

This course introduces graduates to the field of environmental chemistry and provides a foundation for applications in pollution control and water & wastewater technology. Graduates will study the practical aspects of environmental chemistry, quantitative measurements and analysis of air, water and wastewater. Principles of measurement, instrumentation and analysis are emphasized using an application-oriented approach.

CT618 Energy Conservation Management

Energy consumption is at an all-time high, and it is uncertain how high energy costs will go. This module will teach graduates energy conservation efforts and innovative programs to help people, including businesses, get in the habit of using energy more efficiently, thereby saving money, energy and the environment.

CT619 Cement Plant Layout and Utilities

Full review of the plant layout (machinery, handling, wind direction,...) and considering the utilities Compressed air, water system, water quality, mechanical cooling systems, water conditioning towers.

ماجستير العلوم فى علوم وهندسة الطاقة المتجددة

Master of Science in Renewable Energy Science and Engineering

Courses

1. First Semester:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
RE601	Energy Policy and Planning	سياسيات وتخطيط الطاقة	1	1	0	1	50
RE602	Advanced Energy and Environment	الطاقة والبيئة - مادة دراسية متقدمة	2	2	0	2	100
RE603	Advanced Energy Conversion and Storage	تحويل وتخزين الطاقة - مادة دراسية متقدمة	2	2	0	2	100
RE604	Biomass, Biofuels and Biogas	الكتلة الحيوية والوقود الحيوى والغاز الحيوى	2	2	0	2	100
RE605	Advanced Renewable Hybrid Systems	النظم المختلطة للطاقة المتجددة - مادة دراسية متقدمة	2	2	0	2	100
RE606	Bio-Energy Technology	تقنية الطاقة الحيوية	2	2	0	2	100
GC601	Scientific Thinking and Writing	التفكير والكتابة العلمية	1	1	0	1	50

Elective Courses*							
RE608	Energy Demand and Supply	إحتياجات وإمدادات الطاقة	2	2	0	2	100
RE609	Advanced Renewable Energy and Society	الطاقة المتجددة والمجتمع - مادة دراسية متقدمة	2	2	0	2	100

*Student must select one elective course

2. Second Semester:

2A. Solar Energy Technology (SET) Specialization Track:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
RE610	Heat Transport Technology Thermodynamic Cycles	تقنية انتقال الحرارة والديناميكا الحرارية	2	2	0	2	100
RE611	Advanced Photovoltaic Systems Technology	تقنية النظم الكهروضوئية - مادة دراسية متقدمة	2	2	0	2	100
RE612	Advanced Materials Preparation and Characterization	اعداد وتوصيف المواد - مادة دراسية متقدمة	2	2	0	2	100
RE613	Solar Cell Fabrication and Module Technology	تقنية تصنيع الخلايا والألواح الشمسية	2	2	0	2	100

RE614	Research Project*	المشروع البحثي	2	2	0	N/A	100
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***Research Project course includes a presentation and a final report for the student activity assessment**

Elective Courses*							
RE615	Advanced Power Semiconductor Converters	اشباه موصلات محولات القوى - مادة دراسية متقدمة	2	2	0	2	100
RE616	Advanced Solar Cell Technologies	تقنيات الخلايا الشمسية المتقدمة	2	2	0	2	100

***Student must select one elective course**

2B. Fuel cells and Hydrogen production Technology (FHT) Specialization Track:

Compulsory Courses							
Course code	Course title		Total Credit Hours	Lecture Credit Hours	Lab Credit Hours	Exam Duration (hour)	Final grades out of
	English	Arabic					
RE617	Advanced Fuel Cells	خلايا الوقود - مادة دراسية متقدمة	2	2	0	2	100
RE618	Advanced Hydrogen Production and Storage	انتاج وتخزين الهيدروجي - مادة دراسية متقدمة	2	2	0	2	100
RE619	Advanced Polymer Membrane Technology	تقنية أغشية البوليمر المتقدمة	2	2	0	2	100

RE612	Advanced Materials Preparation and Characterization	اعداد وتوصيف المواد - مادة دراسية متقدمة	2	2	0	2	100
RE614	Research Project*	المشروع البحثي	2	2	0	N/A	100

***Research Project course includes a presentation and a final report for the student activity assessment**

Elective Courses*							
RE620	Advanced Hydropower Technology	تقنية الطاقة الكهرومائية - مادة دراسية متقدمة	2	2	0	2	100
RE621	Advanced Renewable Energy Market and Commercialization	سوق الطاقة المتجددة وسبل تسويقها - مادة دراسية متقدمة	2	2	0	2	100

***Student must select one elective course**

Total Credits = 22 Compulsory Courses + 4 Elective Courses

Course Specifications

RE601 Energy Policy and Planning

Global and local trends and developments in Renewable Energy Technologies (solar, wind, bioenergy, etc.) and energy efficiency, economics & pricing of renewable energy systems, overview of energy policies and policy instruments that facilitate investment in renewable energy technologies (renewable energy targets, feed-in-tariffs, etc.), policies for energy access and capacity building; case-studies and analysis of successful and unsuccessful policy options; introduction to energy planning and national energy balance calculations.

RE602 Advanced Energy and Environment

Introduction to Life Cycle Assessment (LCA) of energy technologies; calculation of carbon intensity of national energy generation systems and Greenhouse Gas (GHG) savings; and global environmental benefits of Renewable Energy Technology projects; Introduction to international climate and environmental conventions; carbon markets and clean development mechanism (CDM); Introduction to CDM Methodologies for Renewable Energy and energy efficiency projects.

RE603 Advanced Energy Conversion and Storage

Analysis of thermo-mechanical, thermo-chemical, electrochemical, and photoelectric processes and technologies of renewable energy conversion and storage systems; on-shore and off-shore energy conversion; innovative energy storage devices; energy carriers, synthesized fuels, and fuel reforming. Emphasis is on advanced energy technologies, energy efficiency, systems performance, innovative grid connections, and minimizing environmental impacts.

RE604 Biomass, Biofuels and Biogas

Biomass sources, Biomass conversion process to useful energy, thermal conversion, Chemical conversion, Biochemical conversion, Environmental impact. Biofuels, First-generation biofuels, Ethanol, Biodiesel, Other bio-alcohols, Biofuel gasoline, Vegetable oil, Bioethers, Syngas, Solid biofuels, Second-generation (advanced) biofuels, Sustainable biofuels, Debates regarding the production and use of biofuel, Ethanol biofuels, Algae biofuels, Fungi, Animal Gut Bacteria, Greenhouse gas emissions. Biogas Production, Landfill gas, Technical, Composition, Benefits, Applications, Biogas upgrading.

RE605 Advanced Renewable Hybrid Systems

Introduction to different types of renewable energy systems; the concept of hybrid energy systems that comprise renewable energy technologies, as well as renewable energy technologies with nonrenewable ones, such as the PV-diesel systems. Application of Renewable Hybrid Systems in Rural Electrification, as well as introducing the concept of minigrids. An overview on the design and optimization methodologies of renewable hybrid systems will be

presented, as well as some case studies from literature.

RE606 Bio-Energy Technology

Sources, classification, chemical composition and properties of different biomass materials. Preparation of woody biomass: size reduction, briquetting, drying, storage and handling. Combustion of biomass and cogeneration systems: combustion of woody biomass - theory, calculations and design of equipment. Co-generation in biomass processing industries, co-generation plants - types - layout - energy recovery. Case Studies: combustion of rice husk, use of bagasse for cogeneration. Pyrolysis and Gasification of Biomass: Thermochemical degradation; History of small gas producer Engine systems - Chemistry of gasification - Gas producers - types - operating principles - Gasifier fuels-properties-preparation- conditioning of producer gas - applications - shaft power generation - thermal application - Economics. Thermo-chemical conversion of ligno-cellulose biomass – Biomass processing for liquid fuel production - Pyrolysis of biomass - Pyrolysis regime, effect of particle size, temperature, and products obtained. Thermo-chemical gasification principles: Effect of pressure, temperature and of introducing steam and oxygen.

GC601 Scientific Thinking and Writing

Scientific Planning – How to use a research engine - How to write a proposal – How to write a paper – Research ethics – Publication – social media.

RE608 Energy Demand and Supply

Energy Units and Conversion Factor; Primary, Secondary, Final and Useful Energy; Global and National Energy Demand and Supply; Energy Balance in the National Context; Energy Planning and Forecasting; Rural and Urban Energy.

RE609 Advanced Renewable Energy and Society

Awareness on renewable energy and its environmental and social impact on society, public participation in developing and managing renewable energy projects as well as low carbon society.

RE610 Heat Transport Technology Thermodynamic Cycles

Introduction to thermodynamics; Properties of pure substances; Energy transfer by heat, work, and mass; Energy and mass conservation; Entropy and the second law; Gas and vapor power cycles. Heat transfer by conduction, convection and radiation. Numerical analysis of steady and unsteady conductions. Natural and forced convection. Heat exchangers. Third law of thermodynamics and programmed applications.

RE611 Advanced Photovoltaic Systems Technology

Introduction about renewable energy resources and the most widely utilized renewable Energy technologies. Introducing the electrical power engineering basics, in addition to the solar energy fundamentals. Following that, the PV modules fundamentals and PV systems and components will be introduced, as well as the PV performance analysis. The basic sizing principles of PV systems will be presented, as well as the most common and widely used fabrication methods.

RE612 Advanced Materials Preparation and Characterization

Fundamentals of nanoscience, Preparation of nanomaterials by different techniques. Structural characterization (XRD, XRF, XPS, SAX, Auger, SIMS, etc.), Electrochemical characterization (CV, EIS, E-I curves, etc.), Morphological characterization (SEM, TEM, AFM, STM, etc.), Thermal and mechanical properties, Spectroscopic characterization (UV, VIS, IR, Raman, etc.), Electrical properties and Optical properties. The course includes lab work for providing the students with relevant hands-on experiments.

RE613 Solar Cell Fabrication and Module Technology

Semiconductor Materials: Conduction theory, E-k curves, energy bandgaps, effective mass, direct and indirect transitions. Carrier statistics, intrinsic and extrinsic behavior, mobility, diffusion, is scattering. Equilibrium and non-equilibrium behavior, recombination, Optical and thermal properties. Semiconductor Devices: p-n junctions, depletion region, derivation of I-V characteristics in the dark. Ideal

diode under illumination, Loss mechanisms for real diodes, series and shunt resistances, interface states. Heterojunctions, Anderson model, current transport models, window layers. Introduction to multijunction concepts. Material Fabrication Technologies: Purification of silicon, zone refining and guttering, segregation coefficient. Growth of crystalline silicon, Bridgman, Czochralski and floating zone methods. Epitaxial growth methods, MBE, MOCVD, LPE, VPE. Thin film deposition methods, evaporation, sputtering, wet chemical, spray pyrolysis, and devices-printing. Device Fabrication: Doping, alloying, diffusion and implantation Device processing methods. Deposition of anti-reflection coatings. Photolithography. Dry and wet etching. Surface texturing and passivation techniques.

RE614 Research Project

This project module allow student to choose an area to research relating to a specific industrial, scientific, or development problem and recommend a solution; utilizing relevant hardware and software methods, in order to produce a scientific article and an oral discussion. Such project might be the concept of the student's future master thesis.

RE615 Advanced Power Semiconductor Converters

Semiconductor devices: Driving, snubber and protection circuits; Resonant converters; Switching D.C power supplies; Power conditioners; Applications in the fields of electrical energy utilization.

RE616 Advanced Solar Cell Technologies

Cell and Module Concepts: Flat plate and concentrator cells and modules. Multijunction concepts, Overview of cell types and technology status. Advanced Devices: High efficiency crystalline silicon designs. Passivation, light trapping and contact structures. Cost reduction strategies. III-V devices, high concentration, quantum wells devices, multijunction structures, thermophotovoltaic devices. Thin film solar cells, structures and fabrication, novel device designs. Characterization Methods: Cell measurement, solar simulation, conversion efficiency and spectral response. I-V-T and C-V-f measurements. Measurement and performance standards.

RE617 Advanced Fuel Cells

Introduction to fuel cells, difference between fuel cells, batteries and other energy storage applications. Characteristics of fuel cells (energy efficiency, environmental issues, operating performance, etc.). Fuel cells basics: (thermodynamics and kinetics of electrochemical reactions, types of overpotentials, electrodes reactions in fuel cells, gas diffusion electrode, electrocatalysis, fuel cell efficiency). Fuel Cell electrode based material, catalyst material selection. Nano catalyst fabrications, Characterization of catalysts and investigation of catalyst performance. Fuel cell design and configurations, stack components, Types of Fuel Cell systems: (Phosphoric Acid Fuel Cells, Molten Carbonate Fuel Cells, Solid oxide Fuel Cells, Polymer Electrolyte Fuel Cells, Direct Methanol Fuel Cells, and Alkaline fuel cells). Fuel Cell Applications: Stationary Power Plants, Automotive Power Plants, other Applications. The course includes lab work for providing the students with relevant hands-on experiments.

RE618 Advanced Hydrogen Production and Storage

Chemical Production of hydrogen, Electrochemical Hydrogen Evolution, Solar hydrogen evolution, Partial Oxidation, Steam Reforming, Thermal Decomposition, Syngas, Shift reaction, Methanation, Hydrogen Purification, Desulfurization, CO₂ Removal, Electrolytic Hydrogen, Liquid Electrolyte Electrolyzers, Solid Polymer Electrolyte Electrolyzer, Ceramic Electrolyte Electrolyzer, Photolytic Hydrogen, Solar Photolysis. Storage of Hydrogen by Adsorption, Storage of Hydrogen in Chemical Compound, Metal/Metal oxide Hydrides, Hydrogen Storage Materials, carbon Nanofibres, Sponge Iron, Glass Microspheres, Carbon nanotubes, Aerogels. Materials selection, Catalyst Preparation including nano catalysts, Characterization of catalysts, Infrastructure and distribution of hydrogen, Economic aspects of using hydrogen, Innovation in hydrogen technology. The course includes lab work for providing the students with relevant hands-on experiments.

RE619 Advanced Polymer Membrane Technology

Introduction to polymer science; Needs of Fundamental Materials for Proton Exchange Membranes (PEM) Fuel Cells; Membranes for PEM Fuel Cells, Proton Exchange Membranes, PEMs for DMFCs, Anion Exchange Membranes (AEMs), Organic–Inorganic Composites; Testing of PEMs; Fluoropolymers for Proton Exchange Membranes; Nonfluorinated Polymers for Proton Exchange Membranes; Anhydrous Proton-Conducting Polymers for High-Temperature PEMFCs; Anion Exchange Membranes for Alkaline Fuel Cells; Polymers for New Types of Fuel Cells.

RE620 Advanced Hydropower Technology

Introduction to hydropower, status of large and small hydropower development in the MENA region and the world in terms of potential, installed capacities and on-going projects in the context of rural electrification and agriculture (run-off-river, canal fall based, dam toe, small hydropower, micro hydropower, and Pico hydropower).

RE621 Advanced Renewable Energy Market and Commercialization

Introduction to renewable energy markets and status. The concepts of marketing and sales (consumer behaviors, managing sales, marketing plans, business negotiations) and how to use them in marketing and selling renewable energy technologies.

ثالثاً: درجات الدكتوراه

مقدمة:

من خلال برامج الدكتوراه بكلية الدراسات العليا المتقدمة، سوف تنمي قدرة الطالب لفهم ركيزة المفاهيم العلمية الأساسية للعلوم الحديثة وإدراك واستحداث وابتكار الأفكار باستخدام الطرق المعملية و علي وجه التحديد أدوات التشخيص والتصنيع المستخدمة في العلوم المختلفة كل في مجاله.

الرسالة:

الإرتقاء بالمستوى العلمي سواء من الناحية الأكاديمية والتدريس أو البحث العلمي وخدمة المجتمع لتكوين ركيزة أساسية في دعم أبحاث ومشاريع الدولة والتعاون والمشاركة مع المؤسسات والهيئات المصرية وحتى على المستوى العربي والعالمي لدعم تقدم و رقي الوطن.

الأهداف ومخرجات التعلم المقصودة:

١. إثبات فرضيات مختلفة باستخدام تقنيات و أدوات تجريبية مختلفة لإثبات هذه الفرضيات .
٢. توقع المشاكل و النتائج المحتملة .
٣. وضع استراتيجيات وخطط للحصول على النقطة البحثية .
٤. وضع استنتاج علمي منبثق من الدراسة العملية و صياغة الرسالة المرتبطة بالنقطة البحثية.
٥. اكتساب المهارات اللازمة و الاتجاهات اللازمة للاتصال الفعال والتعاون مع مجموعات العمل في سياقات مهنية مختلفة والتنمية الذاتية وتبادل المعرفة والخبرات مع الآخرين.
٦. أن يتمتع الخريج بالقيم والمعتقدات التي تتناسب مع أخلاقيات مجتمعنا العربي و متمشياً مع قوانينه النافذة.
٧. أن يكون بعض الخريجين المتميزين قادرين على المضي قدما في مجال البحث العلمي والحصول على الشهادات العليا في مجال التخصص.
٨. تعزيز الفضول الفكري والالتزام بالتعلم مدى الحياة.

مادة (١) : شروط القيد

- أ. أن يكون مستوفى لشروط القيد الواردة باللائحة.
- ب. أن يتقدم بطلب الى إدارة الدراسات العليا لقيده بعد موافقة أحد الأساتذة أو الأساتذة المساعدين على الإشراف ويعرض الطالب على مجلس القسم المختص لإعتماد الإشراف وتحديد مجال وخطة البحث
- ت. يحدد مجلس القسم المقررات النظرية التي يجب على الطالب دراستها اذا كان حاصلاً على الماجستير في غير التخصص ثم يعرض الأمر بعد استيفاء جميع المستندات – على لجنة الدراسات العليا والبحوث ثم مجلس الكلية.

مادة (٢): مدة الدراسة

- أ. الحد الأدنى للحصول على درجة الدكتوراه هو سنتان ميلاديتان من التسجيل (تاريخ موافقة الجامعة)
- ب. الحد الأقصى للحصول على درجة الدكتوراه هو خمس سنوات ميلادية من تاريخ التسجيل مع مراعاة حالات وقف القيد ويجوز مد القيد بحد أقصى سنتين ميلاديتين بناء على طلب المشرفين وموافقة مجلس القسم المختص ولجنة الدراسات العليا والبحوث ومجلس الكلية.

مادة (٣): شروط منح الدرجة

- يوصى مجلس الكلية بناء على مجلس القسم المختص ولجنة الدراسات العليا بالكلية منح الدكتوراه في حالات استيفاء الطالب للشروط الآتية:
- ح. مرور سنتين ميلاديتين على الأقل من تاريخ التسجيل (موافقة مجلس الجامعة على التسجيل).
- أ. قبول الرسالة من لجنة الحكم والتوصية بمنح الدرجة طبقاً للائحة.
- ب. نشر أو قبول نشر عدد (٢) بحث في أى من المجالات الأجنبية المعتمدة الدولية.

دكتوراه الفلسفة فى علوم المواد و تكنولوجيا النانو
PhD in Materials Science and Nanotechnology

دكتوراه الفلسفة فى التكنولوجيا الحيوية
PhD in Biotechnology

دكتوراه الفلسفة فى الكيمياء الحيوية الطبية
PhD in Biomedical Chemistry

دكتوراه الفلسفة فى العلوم البيئية والتنمية الصناعية
PhD in Environmental Science and Industrial
development

دكتوراه الفلسفة فى كيمياء وتكنولوجيا صناعة الأسمت
PhD in Cement Chemistry and Technology

دكتوراه الفلسفة فى علوم وهندسة الطاقة المتجددة
PhD in Renewable Energy Science and Engineering





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BENI-SUEF UNIVERSITY (PSAS)
NOVEMBER 7-10, 2017

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