لائحة
الدراسات العليا
بنظام الساعات المعتمدة

كلية الحاسبات والمعلومات - جامعة اسيوط

كلية الحاسبات والمعلومات

كلية معتمدة من الهيئة القومية لضمان الجودة والاعتماد

جامعة أسيوط

كلية الحاسبات والمعلومات

لائحة الدراسات العليا

بنظام الساعات المعتمدة

أبريل ٢٠١٩

الفهرس

مقدمة

تهدف اللائحة الى تحقيق رسالة الدراسات العليا بالكلية في تطوير البحث العلمي في مجالات علوم الحاسب والمعلومات مما يؤدى الى الارتقاء بالبحث العلمي في الكلية ويساعد على تنمية المجتمع المحلى والإقليمي وحتى تكون الكلية مواكبة مع التطوير المستمر.

كما تساعد اللائحة على الابتكار والعمل في مواضيع بحثية متطورة مواكبة مع التطور العلمي العالمي في مجالات علوم الحاسب والمعلومات مما يساعد على التنمية والابتكار.

تعتمد هذه اللائحة على نظام الساعات المعتمدة مسايراً لمرحلة البكالوريوس والتي تتبع هذا النظام بكلية الحاسبات والمعلومات – جامعة أسيوط والذي يعطى مرونة في نظام الدراسة للطالب.

تشمل اللائحة القواعد التنظيمية لقبول قيد وتسجيل الطلاب والمقررات الاجبارية والاختيارية ومنح الدرجات العلمية التي تقدمها الكلية.

هذه الدرجات مقسمة إلى ماجستير ودكتوراه والدبلومات المهنية بالكلية.

رؤية الكلية

تسعى كلية الحاسبات والمعلومات بجامعة أسيوط لتحقيق التميز والابتكار في مجالات التعليم والبحث العلمي وخدمة المجتمع على المستوى المحلى والإقليمي.

وفي إطار هذه الرؤية يمكن تحديد الرؤية الإستراتيجية للبحث العلمي للكلية في المرحلة القادمة ووضعها في صوره خطة تحمل كل العناصر والخطوات المنهجية لبناء إستراتيجيات البحث العلمي.

رسالة الكلية

إمداد الطالب بأصول المعرفة والبحث العلمي في مجالات علوم الحاسب ونظم وتكنولوجيا المعلومات وتنمية شخصية الطالب لجعله راغباً في الابتكار ومحباً للعمل الجماعي وقادراً على المنافسة المحلية والإقليمية، وكذلك تشتمل رسالة الكلية على تقديم خدمة مجتمعية وبحثية متميزة في مجالات الكلية، وتطوير المناهج الدراسية وتحديثها بصورة مستمرة بما يتماشى مع التقدم العلمي ومتطلبات العصر واحتياجات سوق العمل.

وفي إطار هذه الرسالة تم تعريف رسالة الكلية للدارسات العليا على أن تكون على النحو التالي:

رسالة كلية الحاسبات والمعلومات للدارسات العليا والبحوث

إمداد الطالب بمفاهيم البحث العلمي واخلاقياته وتأهيل الكوادر البحثية والعلمية القادرة على معالجة قضايا الحاضر وترسم حلول المستقبل بما يتماشى مع الاتجاهات المحلية والاقليمية والعالمية للبحث في مجالات التخصص.

القواعد العامة المنظمة للدراسات العليا

مادة (١) الدرجات العلمية

تمنح جامعة أسيوط بناءً على طلب مجلس كلية الحاسبات والمعلومات الدرجات العلمية التالية:

أ. ماجستير / دكتوراه في علوم الحاسبات والمعلومات – تخصص علوم حاسب
ب. ماجستير / دكتوراه في علوم الحاسبات والمعلومات – تخصص نظم معلومات
ج. ماجستير / دكتوراه في علوم الحاسبات والمعلومات – تخصص تكنولوجيا المعلومات
د. ماجستير / دكتوراه في علوم الحاسبات والمعلومات – تخصص وسائط متعددة
ه. ماجستير / دكتوراه في علوم الحاسبات والمعلومات –تخصص نظم المعلومات الحيوية
و. ماجستير / دكتوراه في علوم الحاسبات والمعلومات –تخصص هندسة البرمجيات

ويجوز للكلية استحداث درجات أخرى وفقا لأحكام قانون تنظيم الجامعات.

مادة (٢) نظام الدراسة

تقوم الدراسة وفقاً لنظام الساعات المعتمدة وينقسم العام الدراسي الى فصلين دراسيين مدة كل منها أربعة عشر أسبوعاً ويسمح للقيد طبقاً للقواعد الموضحة في مادة (٣) وتحسب التقديرات طبقا للمادة (١٣).

مادة (٣) مواعيد الدراسة والقيد

يعلن عن مواعيد القيد ومواعيد الدراسة في نصف شهر أغسطس بالنسبة للفصل الدراسي الاول وفى نصف شهر يناير بالنسبة للفصل الدراسي الثاني على أن تبدأ الدراسة في الاسبوع الثالث من شهر سبتمبر من الفصل الدراسي الاول والاسبوع الثالث من شهر فبراير للفصل الدراسي الثاني.

مادة (٤) مواعيد التسجيل للفصل الدراسي

دراسة المقررات المختلفة بالكلية في بداية كل فصل دراسي لابد ان يكون التسجيل كتابياً (أو إلكترونياً) في استمارة مخصصة مصحوب بتوقيع الطالب والمرشد الأكاديمي في الفترة التي تحددها الكلية.

مادة (٥) شروط القيد

يشترط لقيد الطالب الدراسات العليا ما يلي:

- التفرغ بما لا يقل عن يومين أسبوعياً وذلك بموجب موافقة صريحة من جهة العمل التي ينتمي لها الدارس.
- درجة البكالوريوس في الحاسبات والمعلومات أو ما يعادلها في مجال التخصص من إحدى الجامعات المصرية.
- أن يكون حاصلا على تقدير جيد (C) على الأقل في مرحلة البكالوريوس.

يجوز لمجلس القسم المختص أن يضيف شروطاً أخرى يراها ضرورية للقبول مثل عدد الطلاب المقبولين بناءً على الامكانيات المتاحة للقسم.

يتم التسجيل لدراسة المقررات المختلفة بالكلية في بداية كل فصل دراسي بعد موافقة المرشد الأكاديمي وذلك خلال اسبوع قبل بدء الدراسة.

مادة (٦) حذف وإضافة المقررات

يسمح حذف وإضافة المقررات خلال اسبوعين من بداية الفصل الدراسي تحت إشراف المرشد الأكاديمي وذلك وفقاً لقواعد ينظمها مجلس الكلية.

لابد ان يكون الحذف والإضافة كتابيا في استمارة مخصصة مصحوبة بتوقيع الطالب والمرشد الأكاديمي.

يجوز للطالب الانسحاب من التسجيل في مقرر وذلك بموافقة المرشد الأكاديمي خلال الستة اسابيع الأولى بشرط الا يقل عن الحد الأدنى لساعات التسجيل من بدء الدراسة وفى هذه الحالة لا يعد الطالب راسباً في المقررات التي انسحب منها ويحتسب انه "منسحب" فقط.

مادة (٧) الاستماع الى مقرر

يحق للطالب حضور مقرراً إضافياً من خارج التخصص بدون احتساب درجات وذلك من غير المقررات المطلوب التسجيل بها وبدون دخول الامتحان النهائي على أن يتم الالتزام بقواعد الحضور بالمادة (١٦) وفى هذه الحالة يسدد مصروفات استماع تقرر من قبل مجلس الكلية، وتسجل في الشهادة (استماع).

مادة (٨) دراسة مقررات خارج الكلية وتحويل الساعات المعتمدة

- يجوز للطالب التسجيل في مقررات دراسية من خارج برنامجه الدراسي ومطروحة من القسم أو الكلية أو كلية أخرى بالجامعة أو جامعات أخرى طالما أنها تخدم تخصصه ولا تتعارض مع شروط البرنامج المسجل فيه الطالب وذلك بناء على اقتراح المرشد الأكاديمي وموافقة مجلس القسم والكلية (يجب أن تضع لجنه إعداد كل برنامج قائمه بالمقررات الاختيارية التي يمكن للطلاب التسجيل بها من خارج الكلية وذلك بالتنسيق مع الكليات الأخرى وبحد أقصى ٦ ساعات معتمدة).
- التحويل: يمكن للكلية قبول واعتماد بعض مقررات دراسات عليا قد درسها الطالب ونجح فيها في جامعة اخرى وبشرط ألا يكون قد تم احتساب هذه المقررات من ضمن متطلبات الحصول على درجة أخرى. يتم الموافقة على احتساب الساعات المعتمدة لهذه المقررات بتوصية من مجلس القسم المختص وبموافقة مجلس الكلية. وتدخل ضمن حساب المعدل التراكمي للطالب.
- لا يسمح لطالب الدراسات العليا في جامعة أسيوط أن يكون مسجلاً في برنامج اخر للدراسات العليا داخل الجامعة او خارجها في نفس الوقت ولا يسمح بتحويل أي ساعات معتمدة في هذه الحالة.

مادة (٩) الارشاد الأكاديمي

يحدد مجلس القسم المختص لكل دارس مرشداً أكاديمياً من أعضاء هيئة التدريس من نفس التخصص الذي يرغب الدارس في التسجيل فيه وذلك لتقديم النصح والارشاد خلال فترة الدراسة وللمساعدة في اختيار المقررات الدراسية اللازمة لمجال البحث كما يقوم المرشد الأكاديمي بمتابعة الطالب دورياً.

مادة (١٠) تأجيل الدراسة

يحق للطالب تأجيل الدراسة أثناء حصوله على المقررات وذلك وفقاً لما يلي:

- تقدم طلبات تأجيل الدراسة في مواعيد التسجيل المحددة بالمادة (٤).
- في حالة الموافقة يثبت للطالب في سجله الأكاديمي الموافقة على الايقاف لذلك الفصل.
- يجوز للطالب أن يؤجل دراسة المقررات في الكلية لمدة لا تزيد عن فصلين دراسيين الا في الحالات الاستثنائية التي يقبلها مجلس الكلية.
- لا تحسب مدة تأجيل الدراسة ضمن المدة المسموح بها للحصول على الدرجة العلمية.
- إذا انقضت فترة تأجيل الدراسة الموافق عليها، ولم يتقدم الطالب لإعادة التسجيل أو إلى تجديد التأجيل يعتبر منقطعاً عن الدراسة ويسجل الفصل الدراسي في سجله الأكاديمي باعتباره منقطعاً ما لم يتقدم بما يثبت سبب تأخره ويوافق عليه مجلس الكلية. وفى حالة عدم موافقة مجلس الكلية بعد توصية لجنة الدراسات العليا على طلب إعادة التسجيل يلغى قيد هذا الطالب.

مادة (١١) إعادة الاستمرار في التسجيل

يعاد تسجيل الطالب بعد تقدمه لإعادة التسجيل وذلك في موعد التسجيل للفصل الدراسي بالمادة (٣).

مادة (١٢) إيقاف التسجيل

يكون وقف التسجيل أثناء التسجيل للرسالة العلمية وفقاً للضوابط التي يقررها مجلس الدراسات العليا والبحوث بالجامعة ويشترط إجراؤه قبل انتهاء المدة الأصلية للتسجيل. ويجوز لمجلس الكلية بناءً على اقتراح مجلس القسم المختص ولجنة الدراسات العليا أن يوقف تسجيل الطالب بدرجة الماجستير أو الدكتوراه وذلك في الحالات الآتية:

- التجنيد: على الطالب أن يتقدم بطلب إيقاف قيده طوال مدة تجنيده مدعما بالمستندات الدالة على ذلك.
- السفر للخارج في مهمة رسمية أو منحة تدريبية عن طريق جهة العمل: على الطالب أن يتقدم بطلب قبل سفره مدعماً بالمستندات الدالة على ضرورة سفره لأكثر من شهر.
- المرض: على الطالب أن يتقدم بطلب عند مرضه مدعماً بشهادة مرضية معتمدة من الإدارة الطبية بالجامعة ومحدداً فيها فترة مرضه على ألا تقل عن شهر.
- مرافقة الزوج أو الزوجة للسفر للخارج: يجب أن يقدم ما يثبت ذلك مدعما بموافقة جهة العمل على إعارة الزوج وموافقة جهة عمل الطالب الى السفر.

- الوضع ورعاية الطفل: على الطالبة أن تتقدم بطلب وقف القيد لرعاية الطفل مدعماً بشهادة ميلاد الطفل.
- حالات أخرى تقبلها لجنة الدراسات العليا ويعتمدها مجلس الكلية.

ويشترط في جميع الحالات ألا تزيد مدة الوقف عن أربعة فصول دراسية خلال مدة التسجيل للدراسات العليا إلا في الحالات التي يتم الموافقة عليها من مجلس الكلية على أن تحتسب فترة تأجيل الدراسة بالمادة (١٠) ضمن هذه المدة.

ماده (١٣) التقديرات

تقدر نقاط التقدير لكل ساعة معتمده كما يلي:

التقدير	النسبة المئوية للدرجة	النقاط
A+	٩٥فأكثر	٤
A	٩٠– أقل من ٩٥	٣,٧
B+	٨٥– أقل من ٩٠	٣,٣
B	٨٠– أقل من ٨٥	٣
C+	٧٥– أقل من ٨٠	٢,٧
C	٧٠– أقل من ٧٥	٢,٣
D+	٦٥– أقل من ٧٠	٢
D	٦٠– أقل من ٦٥	١,٧
F	أقل من ٦٠	صفر

- بالنسبة للماجستير يعتبر الطالب ناجحاً في مقرر إذا حصل على تقدير (D) على الأقل أما بالنسبة للدكتوراه يعتبر الطالب ناجحا في مقرر إذا حصل على C على الأقل.
- يسمح للطالب إذا رسب في أحد المقررات أن يعيد التسجيل في نفس المقرر (دراسة وامتحاناً) بحد أقصى مرتين (إجمالي عدد دخول مرات الامتحان ٣ مرات على الأكثر) وحصوله بحد أقصى على نقاط التقدير الأدنى للنجاح في الدرجة. وفى حاله استنفاذ عدد مرات التسجيل في المقرر، يجوز للطالب إذا كان المقرر إجباريا التسجيل في تخصص آخر كطالب مستجد. وفى هذه حاله تحتسب للطالب المقررات التي تم اجتيازها وكانت ضمن المقررات المطلوبة في التخصص الآخر إن وجدت. إما إذا كان المقرر اختياريا فيمكن للطالب التسجيل في مقرر آخر اختياري وفى هذه الحالة يحتفظ الطالب بالدرجة الحاصل عليها في المقرر الاختياري الجديد.
- إذا لم يتمكن الطالب من تحقيق المعدل التراكمي المطلوب وهو (D) للماجستير و (C) للدكتوراه بعد استنفاذ مرات الرسوب المسموح بها أو مرور أربعه فصول دراسية منذ بداية القيد في البرنامج يقوم مجلس الكلية بدراسة حاله الطالب والتوصية بإلغاء قيد الطالب أو إعطائه فرصه استثنائية لفصل دراسي واحد.
- لا تدخل المقررات التي درسها الطالب في جامعه أخرى وقام بمعادلتها في حساب متوسط النقاط إلا إذا تم معادلتها من قبل مجلس القسم وموافقة مجلس الكلية.
- يمنح الطالب شهادة بتقديرات المقررات باللغة العربية أو باللغة الانجليزية وفقاً لطلبه.

ماده (١٤) إلغاء القيد

يقوم مجلس الكلية بإلغاء قيد الطالب في الحالات الآتية:

- إذا لم يتمكن الطالب من تحقيق المعدل التراكمي المطلوب طبقاً لمادة (١٣) .
- انقطاعه عن الدراسة أو عدم جديته في البحث وذلك بموافقة مجلس القسم المختص ولجنة الدراسات العليا وبناءً على تقرير مفصل من المشرفين على الرسالة وذلك بعد إنذاره بناء على قرار مجلس القسم.
- حالات الغش.
- إذا رفضت لجنه الحكم الرسالة.
- تقدمه بطلب لإلغاء قيده لدرجه الماجستير أو الدكتوراه.
- إذا لم يسدد الرسوم الدراسية المقررة عليه في مواعيد المحددة لذلك.
- في حاله حصول الطالب على بعثه خارجية للحصول على الدرجة أو تحويل إيفاده من أجازه دراسية لجميع المادة العلمية إلى أجازه دراسية للحصول على الدرجة أو تسجيله في برنامج دراسات عليا في جهة أخرى.
- حالات أخرى تقبلها لجنه الدراسات العليا ويعتمدها مجلس الكلية.

ماده (١٥) إعادة القيد

إذا تم إلغاء قيد الطالب يجوز لمجلس الكلية بناء على موافقة مجلس القسم ولجنه الدراسات العليا إعادة قيده بشرط مرور عام من تاريخ موافقة مجلس الكلية على إلغاء القيد ويعتبر قيداً جديداً للدرجة. وعلى الطالب أن يتقدم بطلب إعادة القيد طبقاً للقواعد والمواعيد المعلنة بالكلية. ويمكن لمجلس القسم الموافقة على أن يعفى الطالب من دراسة بعض المقررات إذا لم يكن قد مضى أكثر من ثلاثة سنوات على نجاحه فيها.

ماده (١٦) نظام الحضور في الدراسة

تعتمد الكلية نظام الحضور الكامل ولا تشترط تفرغ الطلاب الكامل للدراسة وتطبق على الطلاب القواعد التالية بالنسبة للحضور:

- يجب ألا تقل نسبه حضور الطالب في المقرر عن ٧٥% من مجموع محاضرات هذا المقرر ما لم يكن قد تغيب بعذر مقبول ويجوز حرمان الطالب من دخول امتحان المقرر الذي تقل فيه النسبة وذلك بناءً على تقرير أستاذ المادة واتخاذ الإجراءات الإدارية بإنذار الطالب مع موافقة مجلس القسم. وفى هذه الحالة يعتبر الطالب راسباً في ذلك المقرر.

ماده (١٧) امتحان غير مكتمل

على الطالب الذي يتغيب عن الامتحان النهائي لمقرر ويريد أن يتقدم إلى عميد الكلية بطلب إجراء امتحان غير مكتمل (incomplete) أن يقدم الطلب خلال فتره أقصاها عشره أيام من تاريخ عقد الامتحان النهائي ويتم اتخاذ القرار بعد استيضاح الحالة والموافقة عليها من أستاذ المادة وموافقة لجنة الدراسات العليا. ويحكم هذه الموافقة الاعتبارات التالية:

- مدى التزام الطالب بنسبه الحضور المقرر.
- وفاء الطالب بالتكليفات والأوراق البحثية إن وجدت وبحيث لا تقل درجات أعمال السنة للطالب عن ٦٠% من الدرجات المخصصة لأعمال السنة لهذا المقرر.
- يحق لمجلس القسم الرفض بناءً على اقتراح أستاذ المادة لأسباب قد يكون من بينها تكراريه الأعذار من نفس الطالب.
- إذا كان قرار مجلس القسم بالموافقة فيحتسب للطالب تقدير " غير مكتمل " في هذا المقرر مع الاحتفاظ بدرجة أعمال السنة وتتاح له فرصة أداء الامتحان النهائي في الموعد الذي تحدده الكلية. ويمنح الطالب الدرجة الكلية الحاصل عليها في الامتحان غير المكتمل.
- إذا صدر القرار النهائي للقسم بعدم الموافقة على عذر الطالب، فيعتبر الطالب راسباً في ذلك المقرر.

ماده (١٨) ضوابط الامتحانات

يكون الامتحان النهائي تحريراً في جميع المقررات ويجوز لمجلس الكلية – بناءً على رأى الأقسام – الموافقة على عقد بعض الامتحانات التطبيقية والمعملية.

- يعقد الامتحان النهائي في نهاية كل فصل دراسي.
- النهاية العظمى لكل مقرر (١٠٠) درجه يخصص منها (٣٠) درجة لأعمال السنة (التمارين العملية، الأبحاث، سمينار، الحضور والمشاركات الناشطة بالمحاضرات) وذلك وفقاً لتوصيف المقرر المعتمد من مجلس الكلية و(٧٠) درجة للورقة الامتحانية النهائية.
- يجوز للطالب أن يتقدم بطلب التماس لمراجعة درجته في المقرر الدراسي (مقابل رسوم تحددها الكلية) خلال مده أقصاها أسبوعين من تاريخ إعلان النتيجة.

ماده (١٩) الإشراف ومتابعة الرسائل العلمية

- تحدد لجنة الاشراف عند القيد وبناءً على موافقة مجلس القسم.
- بعد اجتياز الطالب المقررات الدراسية المطلوبة للدرجة العلمية للتسجيل لدرجتي الماجستير والدكتوراه يعين مجلس الكلية بناءً على اقتراح مجلس القسم المختص مشرفاً رئيسياً من بين الأساتذة أو الأساتذة المساعدين.
- لا يزيد عدد أعضاء لجنه الإشراف عن ثلاثة مشرفين بالنسبة لرسائل الماجستير ولا يزيد عن أربعة مشرفين بالنسبة لرسائل الدكتوراه ويكون من بينهم المشرف الأجنبي إن وجد.
- يجوز أن يعاون في الإشراف مشرف واحد أو أكثر من خارج الجامعة على ألا يزيد عدد المشرفين من خارج الجامعة عنهم من داخلها.
- لا يجوز اشتراك عضو هيئه التدريس وزوجته أو أحد أقاربه حتى الدرجة الرابعة في لجنه الإشراف على الرسائل العلمية. كما لا يجوز إشرافه على الرسائل المقدمة من أحد أقاربه حتى الدرجة الرابعة نسباً أو صهراً وينطبق ذلك على الامتحانات وحلقات البحث وتشكيل لجان الحكم والمناقشة.
- في حاله إعارة المشرف أو سفره خارج البلاد لمده عام جامعي يعتبر متنازلاً عن الرسائل المشرف عليها بعد موافقة مجلس القسم ومجلس الكلية.

- يحتفظ باسم المشرف المتوفى إذا قضى نصف مده الإشراف قبل الوفاة على أن يستحق هذا المشرف جزءً من مكافأة الإشراف بما يتمشى مع هذه المدة.
- لمجلس الكلية ان يقوم بتعديل لجنه الإشراف بالرفع أو بالإضافة أو بكليهما بناءً على اقتراح المشرف الرئيسي وموافقة مجلس القسم المختص ولجنه الدراسات العليا واعتماد التعديل من نائب رئيس الجامعة للدراسات العليا والبحوث بما لا يتعارض مع ما سبق من نقاط بهذا البند.
- تقدم لجنة الاشراف في نهاية كل فصل دراسي تقرير إلى مجلس القسم المختص عن مدى تقدم الطالب ولجنة الاشراف توصى باستمرار القيد أو إلغائه.
- يجوز تغيير موضوع دراسة الطالب في نفس تخصصه بالقسم وذلك بناءً على اقتراح لجنة الاشراف وموافقة مجلس القسم المختص ومجلس الكلية ونائب رئيس الجامعة لشئون الدراسات العليا والبحوث.
- على الطالب عند الانتهاء من الرسالة أن يقدم الى الكلية ٥ نسخ للرسالة في صورتها النهائية ومكتوبة آلياً.

ماده (٢٠) السمينارات

- يقوم الطالب بتقديم ٢ سمينار الأول منهما بعد نجاحه في المقررات الدراسية المطلوبة للدرجة، ويقوم الطالب فيه بعرض مقترح لموضوع الرسالة على أن يتم التسجيل للرسالة في موعد أقصاه ستة أشهر من تاريخ عقد السمينار الأول. والسيمنار الثاني قبل تشكيل لجنة الحكم والمناقشة.
- يتم تشكيل لجنه للسيمنار من مجلس القسم المختص من ثلاثة أعضاء على الأقل تقترحهم لجنه الإشراف على الرسالة ويجوز الاستعانة بمتخصصين من الأقسام الأخرى بالكلية أو خارجها.
- يحق للجنه إقرار السمينار الأول اقتراح تعديلات على موضوع البحث كما يحق للجنة في السمينار الثاني تقييم العمل وتقديم المقترحات لإخراج البحث بالشكل المطلوب. على أن تعرض هذه التقارير على مجلس القسم لاعتمادها.

ماده (٢١) رسوم الدراسة

- يتم احتساب رسوم دراسية عن كل مقرر يتم التسجيل فيه ودفع الرسوم في المواعيد التي يتم الإعلان عنها بالكلية لكل فصل دراسي كما يتم سداد الرسوم بالنسبة للمسجلين بالرسالة (ماجستير – دكتوراه) عند التسجيل وتسديد الرسوم في بداية العام الجامعي وذلك طبقاً لقانون تنظيم الجامعات بشأن الرسوم الدراسية.
- يتم إلغاء قيد الطالب ادارياً في حاله عدم سداده الرسوم الدراسية المقرر ٥ خلال شهرين من بداية الفصل الدراسي دون الحاجة إلى إنذاره وذلك بالنسبة لفترة دراسة المقررات. إما في فتره التسجيل للرسالة فيتم إلغاء قيد الطالب ادارياً بعد إنذاره مره واحده بحد أقصى شهرين من تاريخ الإنذار.

مادة (٢٢) شروط المنح

- اجتياز الطلب لامتحان (Local TOEFL) بدرجة ٤٥٠ على الأقل أو (IELTS) بدرجة ٦ على الأقل (شرط منح).
- مرور أربعه فصول دراسية على الأقل من تاريخ القيد.

- نجاح الطالب في المقررات الدراسية بتقدير (C) على الأقل للدكتوراه، و(D) على الأقل للماجستير.
- قبول الرسالة من لجنه الحكم والمناقشة والتوصية بمنح الدرجة.
- النشر العلمي أو القبول بالنشر بأحد المجلات أو المؤتمرات العلمية المحكمة ذات التخصص:
  - ورقه بحثيه على الأقل في الماجيستير وعلى الأقل في مؤتمر علمي دولي مفهرس.
  - ٢ ورقة بحثية على الأقل في الدكتوراه في مجلات علمية دولية مفهرسة في قاعدة بياناتWeb of Science أو Scopus.

مادة (٢٣) اضافة وحذف مقررات اختياريه

يجوز لمجلس الكلية اضافة او حذف مقررات اختياريه بناءً على اقتراح مجلس القسم المختص.

الدرجات العلمية

درجة الماجستير في الحاسبات والمعلومات

يقوم الطالب بدراسة ٣٦ ساعة معتمدة كالاتي:

الساعات المعتمدة	البيان
٦	ساعات دراسية اجبارية
١٢	ساعات مقررات اختيارية
٢	سيمنار
١٦	رسالة الماجستير
٣٦	المجموع

درجة الدكتوراة في الحاسبات والمعلومات

يقوم الطالب بدراسة ٤٨ ساعة معتمدة كالاتي:

الساعات المعتمدة	البيان
١٢	مقررات دراسية
٢	سيمنار
٤	أوراق بحثية
٣٠	رسالة الدكتوراه
٤٨	المجموع

المقررات الدراسية وتوصيف المقررات

النظام الكودي للأقسام

القسم/ التخصص	الكود باللغة الانجليزية
نظم معلومات	IS
تكنولوجيا المعلومات	IT
علوم الحاسب	CS
وسائط متعددة	MM
نظم معلومات حيوية	BNF
هندسة البرمجيات	SE

الدرجة	رقم المقرر
الدبلوم	500
الماجيستير	600
الدكتوراه	700

مقررات الماجستير والدكتوراه في نظم المعلومات

مقررات الماجستير في نظم المعلومات

المقررات الاجبارية

كود المقرر	اسم المقرر	عدد الساعات المعتمدة
IS600	Big Data Management	3
IS601	Research Methodologies	3

المقررات الاختيارية

كود المقرر	اسم المقرر	عدد الساعات المعتمدة
IS602	Big Data Analytics	3
IS603	Intelligent Information Retrieval Systems	3
IS604	Digital Education	3
IS605	Algorithms for Data Science	3
IS606	Social Network Analytics I	3
IS607	Information Visualization	3
IS608	Advanced Database Management	3
IS609	Knowledge Management	3
IS610	Semantic Data Integration	3
IS611	Data Protection and Preservation	3
IS612	Research Seminars in Informatics	3
IS613	Selected Topics in Information Systems I	3
IS614	Selected Topics in Information Systems II	3
CS600	Advanced Topics in Machine Learning	3
CS603	Grid and Cloud Computing	3
CS606	Natural Language Processing	3
CS610	Deep Learning	3
BNF604	Research Seminars in Bioinformatics	3

1. **Course Name:** **Big Data Management**
   Course Code: **IS600**
   Credits: **3**
   Course Contents: The course focuses on central aspects of big data characteristics. It will cover tractability and parallel scalability of querying big data (volume), data models and data interoperability (variety), and foundations of data quality and uncertainty (veracity) and other characteristics. It aims to expose students to current research and development in connection with big data theory and prepare them for conducting research in this emerging area. The course content is dynamic and continuously updated to cover the state-of-the-art in big data theory. In addition, NoSQL and other big data management models are discussed.

2. **Course Name:** **Research Methodologies**
   Course Code: **IS601**
   Credits: **3**
   Course Contents: Preparation for research in informatics and technical communication skills will be discussed. In addition, design and evaluation of experiments are evaluated. Writing abstracts

and literature review, reviewing and criticizing research papers are taught and illustrated to the students. Identifying good venues from bad ones in addition to writing research proposals are clarified.

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3. **Course Name:** **Big Data Analytics**
   Course Code: **IS602**
   Credits: **3**
   Course Contents: In this course, we will look at the phenomenon of big data from multiple perspectives: practical, theoretical, statistical, etc. Possible solutions to the problem of big data involve compression, mining, cleaning, database design, visualization, interface design, security, etc. Specifically, this course examines information management in the context of massive sets of data, provides students proficiency with a variety of data analysis tools, and exposes learners to varied data platforms as well as skills and concepts related to data mining and statistical analysis within a business context. Topics may include: uses of data mining, Data mining algorithms. Students will work on application areas that create or use big data and will be expected to work on relevant projects and to give presentations (mainly focusing on the 5 key Big Data use cases: Big Data exploration, enhanced 360o view of the customer, security/intelligence, extension, operations analysis, and data warehouse augmentation.

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4. **Course Name:** **Intelligent Information Retrieval Systems**
   Course Code: **IS603**
   Credits: **3**
   Course Contents: The focus in this course is on the underlying retrieval models, algorithms, and system implementations. Also examined is how an effective information search and retrieval is interrelated with the organization and description of information to be retrieved. Topics include: automatic indexing; thesaurus generation; Boolean, vector-space, and probabilistic models; clustering and classification; information filtering; distributed IR on the WWW; intelligent information agents; IR system evaluation; information visualization; and natural language processing in IR. Throughout the course, current literature from the viewpoints of both research and practical retrieval technologies both on and off the World Wide Web will be examined.

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5. **Course Name:** **Digital Education**
   Course Code: **IS604**
   Credits: **3**
   Course Contents: Present the field of digital education and interventions facilitated by the huge advancement in computing and online communication. Topics covered include: online textbooks, MOOCs, application of visual presentations in educational settings, game based learning, educational data mining and learning analytics, concept inventories and instrument design, and pedagogical evaluation of educational interventions. A group project that adds to the current state of the art is required to pass this course.

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6. **Course Name:** **Algorithms for Data Science**
   Course Code: **IS605**
   Credits: **3**
   Course Contents: Methods for organizing data, e.g. hashing, trees, queues, lists, priority queues. Streaming algorithms for computing statistics on the data. Sorting and searching. Basic graph

models and algorithms for searching, shortest paths, and matching. Large scale applications from signal processing, collaborative filtering, recommendations systems, etc.

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7. **Course Name:** **Social Networks Analytics I**
   Course Code: **IS606**
   Credits: **3**
   Course Contents: Study, review and discuss methods, models and algorithms for Social Network Analysis (SNA) with a focus on applications of these methods using relevant examples. Demonstrate a critical and broad understanding of Social Network Analysis (SNA) with a series of well-defined concepts, models, algorithms, and applications. Explain the strength and weaknesses of different social network models and algorithms.

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8. **Course Name:** **Information Visualization**
   Course Code: **IS607**
   Credits: **3**
   Course Contents: The course aims to give an understanding in how information can be designed and presented to provide efficient and effective knowledge transfer and decision-making. The course provides an overview of the human sensory and cognitive systems, and focus on how different designs of information affect understanding. Screen based as well as other types of interactive interfaces as means to efficiently and unambiguously present information is discussed. The course is structured based on the sensory and perceptive human systems like vision, memory, spatial ability and visual thinking. Base material is the course literature and current scientific papers in relevant areas.

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9. **Course Name:** **Advanced Database Management**
   Course Code: **IS608**
   Credits: **3**
   Course Contents: Today, databases are moving away from typical management applications, and address new application areas. For this, databases must consider (1) recent developments in computer technology, as the object paradigm and distribution, and (2) management of new data types such as spatial or temporal data. This course introduces the concepts and techniques of some innovative database applications.

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10. **Course Name:** **Knowledge Management**
    Course Code: **IS609**
    Credits: **3**
    Course Contents: This course addresses the issues involved in creating, curating, managing and using knowledge in e-business applications. Topics covered in the course include: The knowledge management life cycle model; Leadership in dynamic e-business environments; E-business models and networks.

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11. **Course Name:** **Semantic Data Integration**
    Course Code: **IS610**
    Credits: **3**
    Course Contents: This course discusses the concepts of semantic data integration, illustrating ontologies in addition to ontology matching, ontology merging, and ontology merging algorithms. Examples of ontologies in different domains are explained. In addition, data

exchange formats are discussed with available recent technologies. Linked open data are also illustrated.

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12. **Course Name:** **Data Protection and Preservation**
Course Code: **IS611**
Credits: **3**
Course Contents: Definitions, substitution and transposition ciphers, principles of modern cryptography, perfect secrecy, private key encryption schemes, pseudo randomness, pseudorandom functions and permutations, chosen plaintext attacks, modes of operation for block ciphers, linear feedback shift registers and how to break them, DES, AES, meet-in-the-middle attacks. RSA public key cipher and signatures, discrete logarithms, Diffie-Hellman key exchange, Pohlig-Hellman cipher, ElGamal, mental poker, oblivious transfer, zero-knowledge proofs. Hash functions and digital signature algorithm, subliminal channels. Signing contracts by email. Digital cash, electronic voting. Key exchange protocols. Kerberos, PGP, random number generation. Integer factoring algorithms. Elliptic curves applied to cryptography.

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13. **Course Name:** **Research Seminars in Informatics**
Course Code: **IS612**
Credits: **3**
Course Contents: A series of lectures given by faculty, students or outside scholars on research and research methods related to informatics applied in various domains.

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14. **Course Name:** **Selected Topics in Information Systems I**
Course Code: **IS613**
Credits: **3**
Course Contents: This course covers the most recent research topics in Information systems research areas.

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15. **Course Name:** **Selected Topics in Information Systems II**
Course Code: **IS614**
Credits: **3**
Course Contents: This course covers the most recent research topics in Information systems research areas.

مقررات الدكتوراه في نظم المعلومات

كود المقرر	اسم المقرر	عدد الساعات المعتمدة
IS700	Advanced Big Data Analytics	3
IS701	Inference and Representation for Data Science	3
IS702	Social Networks Analytics II	3
IS703	Seminars in Informatics II	3
IS704	Advances in Database Management II	3
IS705	Selected Topics in Information Systems I	3
IS706	Selected Topics in Information Systems II	3
CS701	Advanced Artificial Intelligence	3
CS711	Advanced Topics in Machine Learning	3
BNF704	Seminars in Bioinformatics II	3

1. **Course Name:** **Advanced Big Data Analytics**
   Course Code: **IS700**
   Credits: **3**
   Course Contents: Advanced techniques, such as ensemble modeling, artificial (deep) neural networks and others are taught. The data science tools ecosystem will be explained as well as Spark streaming and other stream processing engines will be illustrated. The course content is dynamic and continuously updated to cover the state-of-the-art in big data theory. In addition, research on NoSQL, Neo4J and Cypher will be defined. Applications and use cases (special topics), such as text mining, social network mining, recommender systems and web mining will be considered.

2. **Course Name:** **Inference and Representation for Data Science**
   Course Code: **IS701**
   Credits: **3**
   Course Contents: We will study latent variable graphical models (Latent Dirichlet Allocation, Factor Analysis, Gaussian Processes), state-space models for time series (Kalman Filter, HMMs, ARMA), Gibbs Models, Deep generative models (Variational autoencoders, GANs), and causal inference, covering both the methods (exact/approximate inference, sampling algorithms, exponential families) and modeling applications to text, images and medical data.

3. **Course Name:** **Social Networks Analytics II**
   Course Code: **IS702**
   Credits: **3**
   Course Contents: Understanding crowdsourcing platforms and citizen science, and knowledge sharing platforms, etc.). This subject will introduce you to algorithms for Social Computing, and provide you with insights of how these systems influence human behaviors, how to improve current implementations, and how to identify ways to better support social activities and interactions. Write research paper of this topic and propose new ideas for solving research problems of social network analysis. Study clustering and classification of social networks, illustrating overlapped graphs and very large graphs of social networks.

4. **Course Name:** **Seminars in Informatics II**
   Course Code: **IS703**
   Credits: **3**

Course Contents: A series of lectures given by faculty, students or outside scholars on research and research methods related to informatics applied in various domains.

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5. **Course Name:** **Advanced Database Management II**
   Course Code: **IS704**
   Credits: **3**
   Course Contents: Recent research on database management systems in various domains are dynamically changing in recent topics.

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6. **Course Name:** **Selected Topics in Information Systems I**
   Course Code: **IS705**
   Credits: **3**
   Course Contents: This course covers the most recent research topics in Information systems research areas.

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7. **Course Name:** **Selected Topics in Information Systems II**
   Course Code: **IS706**
   Credits: **3**
   Course Contents: This course covers the most recent research topics in Information systems research areas.

مقررات الماجستير والدكتوراه في نظم المعلومات الحيوية

مقررات الماجستير في نظم المعلومات الحيوية

المقررات الاجبارية

كود المقرر	اسم المقرر	عدد الساعات المعتمدة
IS600	Big Data Management	3
IS601	Research Methodologies	3

المقررات الاختيارية

كود المقرر	اسم المقرر	عدد الساعات المعتمدة
BNF600	Advanced Topics in Computational Biology	3
BNF601	Biological Data Mining	3
BNF602	Drug Discovery in Bioinformatics	3
BNF603	Systems Biology	3
BNF604	Research Seminars in Bioinformatics	3
BNF605	Biostatistics	3
CS600	Advanced Topics in Machine Learning	3
CS603	Grid and Cloud Computing	3
CS606	Natural Language Processing	3
CS610	Deep Learning	3
IS602	Big Data Analytics	3
IS605	Algorithms for Data Science	3
IS607	Information Visualization	3
IS610	Semantic Data Integration	3

1. **Course Name:** **Advanced Topics in Computational Biology**
   Course Code: **BNF600**
   Credits: **3**
   Course Contents: This course focuses on solving fundamental problems related to molecular biology and genomics with a special focus on the analysis of high throughput sequence data; genome structure, discovery and evolutionary analysis of genomic repeats and duplications, genome sequence analysis and motif discovery, non-coding RNA identification and search, RNA interaction prediction and search.

2. **Course Name:** **Biological Data Mining**
   Course Code: **BNF601**
   Credits: **3**
   Course Contents: Identification of expressed genes, Selection bias of gene expression data. Application of dimensionality reduction techniques for microarray gene expression. Clustering techniques in bioinformatics. Classification techniques in Bioinformatics.

3. **Course Name:** **Drug Discovery in Bioinformatics**
   Course Code: **BNF602**
   Credits: **3**

Course Contents: Describe and justify the role and importance of the various disciplines involved in the different phases of drug discovery and development. Review and evaluate preclinical and clinical pharmaceutical studies with a general understanding of aim, choice of procedures, results, conclusions and importance. Explain scientific, ethical and market-related considerations of importance in the drug development. Carry out searches in databases to retrieve information relevant to the development of a new drug. Account for decision points in the drug development process.

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4. **Course Name:** **Systems Biology**
   Course Code: **BNF603**
   Credits: **3**
   Course Contents: Recognize the theme, objective and application of Systems Biology. Identify Modelling basics and biological processes modelling. Distinguish various algorithms for automated reverse engineering of regulatory networks, metabolic networks, and signaling networks. Model complex biological systems, including gene-gene interactions and protein-protein networks.

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5. **Course Name:** **Research Seminars in Bioinformatics**
   Course Code: **BNF604**
   Credits: **3**
   Course Contents: A series of lectures given by faculty, students or outside scholars on research and research methods related to bioinformatics.

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6. **Course Name:** **Biostatistics**
   Course Code: **BNF605**
   Credits: **3**
   Course Contents: Describe the roles biostatistics serves in public health and biomedical research. Explain general principles of study design and its implications for valid inference. Assess data sources and data quality for the purpose of selecting appropriate data for specific research questions. Translate research objectives into clear, testable statistical hypotheses.

مقررات الدكتوراه في نظم المعلومات الحيوية

كود المقرر	اسم المقرر	عدد الساعات المعتمدة
BNF700	Biological Networks	3
BNF701	Advanced Topics in Computational Genomics	3
BNF702	Biomedical Informatics	3
BNF703	Research Opportunities in Bioinformatics	3
BNF704	Seminars in Bioinformatics II	3
CS701	Advanced Artificial Intelligence	3
CS711	Advanced Topics in Machine Learning	3
IS700	Advanced Big Data Analytics	3
IS701	Inference and Representation for Data Science	3

1. **Course Name:** **Biological Networks**
   Course Code: **BNF700**
   Credits: **3**
   Course Contents: Understanding crowdsourcing platforms and citizen science, and knowledge sharing platforms, etc.). This subject will introduce you to algorithms for Social Computing, and provide you with insights of how these systems influence human behaviors, how to improve current implementations, and how to identify ways to better support social activities and interactions. Write research paper of this topic and propose new ideas for solving research problems of social network analysis. Study clustering and classification of social networks, illustrating overlapped graphs and very large graphs of social networks.

2. **Course Name:** **Advanced Topics in Computational Genomics**
   Course Code: **BNF701**
   Credits: **3**
   Course Contents: This is a course on the application of genome-related concepts to genome sequence data. Further, students will come to understand the connections between standard computational and statistical approaches and their underpinnings in those fields increasingly dominated by genomic approaches, these include the fields of molecular evolution, population genetics, molecular genetics, molecular biology, and biochemistry.

3. **Course Name:** **Biomedical Informatics**
   Course Code: **BNF702**
   Credits: **3**
   Course Contents: Survey methods in biomedical informatics, including methods and approaches in clinical informatics, imaging and population health informatics. Basic concepts, trends, and best practices in biomedical informatics and biomedical research, including research ethics.

4. **Course Name:** **Research Opportunities in Bioinformatics**
   Course Code: **BNF703**
   Credits: **3**
   Course Contents: Research topics in bioinformatics, genomics, and computational genetics and preparation for computational interdisciplinary research in genetics and genomics. Topics include genome analysis, regulatory genomics, association analysis, association study design, model organisms, and other research opportunities in bioinformatics.

5. **Course Name:** **Seminars in Bioinformatics II**
Course Code: **BNF704**
Credits: **3**
Course Contents: A series of lectures given by faculty, students or outside scholars on research and research methods related to bioinformatics.

مقررات الماجستير والدكتوراة في تكنولوجيا المعلومات

مقررات الماجستير في تكنولوجيا المعلومات

المقررات الاجبارية

كود المقرر	اسم المقرر	عدد الساعات المعتمدة
IT600	Wireless Network	3
IT601	Modern Network Architectures and Implementation	3

المقررات الاختيارية

كود المقرر	اسم المقرر	عدد الساعات المعتمدة
IT602	Mobile and Distributed Computing	3
IT603	Network and Mobile Forensics	3
IT604	Cybersecurity	3
IT605	Selected Topics in Information Technology I	3
IT606	Selected Topics in Information Technology II	3
CS600	Advanced Topics in Machine learning	3
CS601	Advanced Algorithms Analysis and design	3
CS603	Grid and Cloud Computing	3
CS608	Advanced Algorithmic Graph Theory	3
CS610	Deep Learning	3
CS612	Advances in Computer Vision	3
CS614	Data Compression	3
IS602	Big Data Analytics	3
IS606	Social networks analytics I	3
MM603	Multimedia Security	3
MM605	3D Visual Communications	3
SE601	Software System Design and Architecture	3
BNF604	Research Seminars in Bioinformatics	3
MATH600	Advanced Probability and Statistics	3
EE600	Advanced Embedded Systems	3
EE601	Advanced Computer Architecture	3

1. **Course Name:** **Wireless Network**
   Course Code: **IT600**
   Credits: **3**
   Course Contents: This course aims to provide topics in the area of wireless networks and the emerging area of cyber-physical-system/Internet-of-Things. The course will cover wireless networking across all layers of the networking stack. Different network technologies with different characteristic will also be covered, including cellular networks, Wi-Fi, Bluetooth and ZigBee. Some key concepts that cut across all layers and network types are covered such as mobility management, energy efficiency, and integration of sensing and communications. Security issues in wireless network are discussed. Recent topics in wireless sensor/adhoc networks are proposed. Topics also include: basics of sensor/adhoc networks; communication characteristics and deployment mechanisms, sensor and actuator interfacing; feedback control; current and future platforms; energy sources and storage; distributed power aware; Medium

access control protocols; Routing protocols; Transport layer and security protocols; Clustering techniques; Mobility; Middleware and security issues; Sensor network programming challenges; Embedded Operating System; Simulators; Applications of Ad-Hoc/sensor Network and Future Directions.

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2. Course Name: Modern Network Architectures and Implementation
Course Code: IT601
Credits: 3
Course Contents: This course focuses on Network architectures for distributed systems and for modern networks such as Cloud and Fog computing and Internet of things (IOT). It illustrates the protocols and topologies. It introduces a comparison between different architectures. In this course distributed, multi-user applications are designed and implemented using many underlying technologies that must be coordinated to provide important features such as robustness, scalability, manageability, ubiquitous access, privacy, security, authentication, and role-based access control. Students will be provided with an advanced overview of current networking and distributed systems topics, and will apply it to case studies drawn from consumer internet applications, enterprise systems, and medical and healthcare systems.

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3. Course Name: Mobile and Distributed Computing
Course Code: IT602
Credits: 3
Course Contents: This course introduces an overview of the issues involved in developing mobile and distributed applications. Some topics to be covered include: scalable, reliable, and energy efficient distributed computing over mobile devices, wireless technologies, disconnected operation, power and bandwidth adaptation, location awareness and tracking, resource discovery, Mobile-IP, and ad-hoc routing. The course overviews various mobile computing applications, technologies and wireless communication. It covers common paradigms in mobile computing such as low power computing, computing in an environment with limited resources, fault tolerance, and persistence. The course covers some current research in mobile computing.

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4. Course Name: Network and Mobile Forensics
Course Code: IT603
Credits: 3
Course Contents: The course discusses techniques for identifying vulnerable target systems and types of malicious code, for mitigating security risks, and for recognizing attack patterns. It also presents the conceptual and operational tools necessary for analysis and resolution of problems with respect to effective filters and firewalls, attack tracing, system recovery, continuity of operation, evidence collection, evidence analysis, and prosecution. It presents tools to compare active and passive approaches to network forensics. It describes the attacks that can reveal the contents of an encrypted network communication. Also it introduces tools to prepare an inventory of the files on a mobile device (e.g., a phone, tablet, or embedded system), prepares a list of the applications and remote services used by a mobile device. It illustrates how to use forensic tools specific to major mobile operating systems. It introduces tools to unlock and root mobile devices.

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5. Course Name: Cybersecurity
Course Code: IT604
Credits: 3

Course Contents: This course covers topics such as Cybersecurity principles, Data Security, Software Security, Connection Security, System Security, Human Security, Societal Security, Security architecture, Risk management; Cyberattacks and detection; Vulnerabilities, threats, and risk, incidents, and emerging IT technologies.

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6. **Course Name:** **Selected Topics in Information Technology I**
   Course Code: **IT605**
   Credits: **3**
   Course Contents: This course covers the most recent research topics in Information technology research areas.

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7. **Course Name:** **Selected Topics in Information Technology II**
   Course Code: **IT606**
   Credits: **3**
   Course Contents: This course covers the most recent research topics in Information technology research areas.

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8. **Course Name:** **Advanced Embedded Systems**
   Course Code: **EE600**
   Credits: **3**
   Course Contents: This course presents advanced techniques for solving problems with embedded microcontroller-based systems. Topics include Real Time Operating Systems, low power operation modes, code optimization, programming various modules, system response, Finite State Machines, methodologies for developing networked embedded systems and applications.

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9. **Course Name:** **Advanced Probability and Statistics**
   Course Code: **MATH600**
   Credits: **3**
   Course Contents: This course covers topics such random experiments probability axioms, conditional probability, and counting methods. Single and multiple random variables (discrete, continuous, and mixed), joint distributions, functions of random variables, moment-generating functions, expectation, variance, covariance, characteristic functions, random vectors, and inequalities. Operations on multiple dependent and independent random variables. Stochastic processes, Markov processes. Network traffic distributions. Limit theorems and convergence. Mathematical statistics such as Bayesian and classical statistical inference, Point and interval estimation, hypothesis testing, and linear regression. Some important random processes including processing of random signals such as Poisson processes, discrete-time and continuous-time Markov chains, and Brownian motion. Simulation tools such as MATLAB and R.

مقررات الدكتوراه في تكنولوجيا المعلومات

كود المقرر	اسم المقرر	عدد الساعات المعتمدة
IT700	Advanced Topics in Computer Networks	3
IT701	Advanced Topics in Network Security	3
IT702	Cloud Computing	3
IT703	Network Performance Analysis and Simulations	3
IT704	Internet of Things (IoT)	3
IT705	Advanced Topics in Information Technology I	3
IT706	Advanced Topics in Information Technology II	3
CS700	Advanced Topics in Distributed Computing	3
CS701	Advanced Artificial Intelligence	3
CS708	Advanced Cryptography	3
IS700	Advanced Big Data Analytics	3
IS702	Social Networks Analytics II	3
MM700	Visualization	3
MM701	Augmented Reality Systems	3
MM706	Research Topics in Human Computer Interaction	3
BNF701	Advanced Topics in Computational Genomics	3
BNF704	Seminars in Bioinformatics II	3
EE700	Robotics: Science and Systems	3

1. **Course Name:** **Advanced Topics in Computer Networks**
   Course Code: **IT700**
   Credits: **3**
   Course Contents: This course includes introduction to classic and advanced topics in computer networks. It emerges with skills in designing, deploying, maintaining, hardening, and upgrading state-of-the-art networks. Different topics in modern wired and wireless networks will be investigated. It introduces topics of the state-of-the-art in network architecture, protocols, and networked systems, and applications. The course illustrates how to conduct networking research and develop innovative ideas. Some topics can be discussed deeply such as the design and implementation techniques essential for engineering both robust networks and Internet-scale distributed systems, software-defined networks, and programmable data-planes. End-to-end Arguments in System Design, wireless networking and protocols, Multi-Hop Wireless Routing, peer-to-peer systems, video streaming, overlay networks and applications, Network Services: QoS, Fair Queuing, distributed storage systems and network security. It covers the current challenges and solutions in networking and large-scale systems.

2. **Course Name:** **Advanced Topics in Network Security**
   Course Code: **IT701**
   Credits: **3**
   Course Contents: This course provides some advanced theoretical and applied topics in security field. It includes the formulation of a security model for the target system. It gives comprehensive coverage of secure network design, large-scale system architecture, control and coordination algorithms, deadlocks, scalability, realistic traffic estimation, computational intelligence, hardware, complex software, and asynchronous timing. Some advanced topics are covered such as advanced topics in cryptography, information hiding, advanced authentication and intrusion detection, formal analysis of authentication protocols and message integrity, block encryption, and cipher-block chaining, access control in distributed systems and networks, firewall design.

Also, emphasis is given to reviewing some application in security field, Blockchain concepts and security frameworks.

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3. **Course Name:** **Cloud Computing**
   Course Code: **IT702**
   Credits: **3**
   Course Contents: This course covers topics such as Cloud and fog computing, Public cloud infrastructures, cloud architecture basics, end to end design, cloud application architectures, how to move application into the cloud, specialized cloud architecture, Virtualization, Software defined networks and storage, Cloud storage, Programming models, and Cloud Privacy and Security and data considerations.

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4. **Course Name:** **Network Performance Analysis and Simulations**
   Course Code: **IT703**
   Credits: **3**
   Course Contents: This course covers concepts necessary for network performance and algorithms. It focuses on design and performance analysis of modern computer networks and distributed systems using probability models, algorithms and optimization techniques that are most commonly used to solve complex problems in networking. Major topics include, introduction to algorithms and graph theory, algorithms for solving common problems in networks design, fundamentals of simulation and analytical modeling techniques, simulator design and model calibration, modeling and simulation lifecycle, principles of discrete-event modeling and simulation, input data modeling, model development and programming; model verification and validation, model output analysis, design of simulation experiments, comparison and evaluation of system design alternatives; applications of simulation in Information Technology. The course also covers topics related to work load characterization, tuning, procurement, and capacity planning, design and proof of approximation algorithms, design of meta-heuristic algorithms, formulation techniques for network optimization, linear and non-linear optimization, Design of distributed algorithms with proof of convergence for networks systems.

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5. **Course Name:** **Internet of Things (IoT)**
   Course Code: **IT704**
   Credits: **3**
   Course Contents: This course covers some topics such as IOT concepts, IoT architecture, IoT applications and design, Sensor and actuator interfacing, communications protocols, Machine to Machine Communication, RFID system and its typical application, Software Defined (SDN) and NFV IoT Networking, Cloud Computing-Service Management and Security, supporting technologies such as Fog Computing , securing IoT communications ,Interoperability in Internet of Things, Building an IoT Application, Smart Cities and Smart Homes, Big data analytics for IoT, topics in Wireless sensor networks and Ad hoc networks.

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6. **Course Name:** **Advanced Topics in Information Technology I**
   Course Code: **IT705**
   Credits: **3**
   Course Contents: This course covers the most recent research topics in Information technology research areas.

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7. **Course Name:** **Advanced Topics in Information Technology II**
Course Code: **IT706**
Credits: **3**
Course Contents: This course covers the most recent research topics in Information technology research areas.

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8. **Course Name:** **Robotics: Science and Systems**
Course Code: **EE700**
Credits: **3**
Course Contents: This course presents concepts, principles, and algorithmic foundations for robots and autonomous vehicles operating in the physical world. Topics include sensing, kinematics and dynamics, state estimation, robot vision and Other Sensors, perception, learning, control, motion control and path planning, Navigation Algorithms and Sensor-Based Navigation, embedded system development, Robot programming, and Multi-Agent Robotics. Students design and implement advanced algorithms on complex robotic platforms capable of agile autonomous navigation and real-time interaction with the physical word.

مقررات الماجستير والدكتوراة في علوم الحاسب

مقررات الماجستير في علوم الحاسب

المقررات الاجبارية

كود المقرر	اسم المقرر	عدد الساعات المعتمدة
CS600	Advanced Topics in Machine Learning	3
CS601	Advanced Algorithms Analysis and design	3

المقررات الاختيارية

كود المقرر	اسم المقرر	عدد الساعات المعتمدة
CS602	Computational Complexity	3
CS603	Grid and Cloud Computing	3
CS604	Computability	3
CS605	Logic Programming System	3
CS606	Natural Language Processing	3
CS607	Topics in Knowledge Representation & Reasoning: AI Automated Planning	3
CS608	Advanced Algorithmic Graph Theory	3
CS609	Theory of Quantum Information	3
CS610	Deep Learning	3
CS611	Advanced Topics in Computer Graphics	3
CS612	Advances in Computer Vision	3
CS613	Advanced Topics in Operating Systems	3
CS614	Data compression	3
CS615	Selected Topics in Computer Science I	3
CS616	Selected Topics in Computer Science II	3
IS602	Big Data Analytics	3
IT600	Wireless Network	3
IT601	Modern Network Architectures and Implementation	3
IT602	Mobile and Distributed Computing	3
IT603	Network and Mobile Forensics	3
IT604	Cybersecurity	3
MM603	Multimedia Security	3
MM605	3D Visual Communications	3
SE600	Software Requirements Engineering	3
SE601	Software System Design and Architecture	3
MATH600	Advanced Probability and Statistics	3
EE600	Advanced Embedded Systems	3
EE601	Advanced Computer Architecture	3

1. **Course Name:** **Advanced Topics in Machine Learning**
   Course Code: **CS600**
   Credits: **3**
   Course Contents: The course familiarizes students with the basics of machine learning, including, linear models, least-squares regression, maximum likelihood, regularization & cross-validation,

classification, logistic regression, Deep learning, including, neural networks and convolutional neural networks, optimization, end-to-end learning, and recurrent networks.

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2. **Course Name:** **Advanced Algorithms Analysis and Design**
   Course Code: **CS601**
   Credits: **3**
   Course Contents: The main objective of the course is to explain basic techniques for the development and analysis of advanced algorithms. Revision of NP-completeness, concepts, approximation algorithms, performance, application examples, local search techniques, application examples, randomized algorithms, classification (numerical, Monte Carlo, las Vegas) and application examples Parallel algorithms – Models of computation and complexity measures, Interconnection networks, Parallel algorithmic techniques: application examples, Distributed algorithms , Model and complexity measures, Interconnection networks and network properties, Design and analysis of distributed algorithms: application examples.

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3. **Course Name:** **Computational Complexity**
   Course Code: **CS602**
   Credits: **3**
   Course Contents: Further exposure to the classification of problems based on their computational requirements and to mathematical tools designed to explore the structural consequences of such classifications. Topics include relativization, alternation, provably intractable problems, feasible parallel computation; fixed-parameter tractability and the W-hierarchy; Kolmogorov complexity, including algorithmic and algorithmic prefix complexity and their applications.

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4. **Course Name:** **Grid and Cloud Computing**
   Course Code: **CS603**
   Credits: **3**
   Course Contents: This course focuses on High Performance Computing clusters and web services and their applications in federated and economic models of Grid and Cloud computing. Theory: Flynn's Classification, Evolution of Parallel Computers, Scalar and Vector Processors, Pipelining, SMP, MPP, GPU, Moore's Law, Amdahl's Law, Gustafson's Law, LINPACK, LAPACK. Introduction to High Performance Clusters, Beowulf, Installation, Load Balancing, Distributed File Systems, Introduction to Message Passing, Programming in MPI, Performance Monitoring, Introduction to Cluster utilities: OSCAR, ROCKS. Applications, Concept of distributed systems: salient features Introduction to Java-RMI and Sockets, Introduction to Web Services, Stateful and Stateless Web Services, XML, SOAP, RDF, WSDL, UDDI, REST. Introduction to Grid Computing, Types of Grids, Components of Grids, Virtual Organizations, Volunteer Computing, P2P Computing. Grid utilities: Globus, Condor, BOINC. Applications. Introduction to Cloud Computing, Outsourcing of Resources, Service Oriented Architecture, SaaS, PaaS, IaaS Clouds. Popular Cloud Services: Google AppEngine, Amazon EC2, Microsoft Azure.

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5. **Course Name:** **Computability**
   Course Code: **CS604**
   Credits: **3**
   Course Contents: Familiarizes students with what is meant by a function to be computable or a problem to be decidable e course decidable. Introduces different theorems for testing or

generating computable function. The course include: Introduction to mathematical notation and terminology, algorithmically undecidable problems Register machines, Universal register machine Undecidability of the halting problem Turing machines and the Church-Turing Thesis, Primitive recursive functions function, Partial recursive functions, Recursive and recursively enumerable sets Universal programs Complexity of computation generative models, variational inference, natural language processing, Reinforcement learning, including, Markov decision processes.

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6. **Course Name: Logic Programming System**
   Course Code: CS605
   Credits: 3
   Course Contents: The outline of the course includes Advanced Prolog concepts and programming techniques, Horn clause logic and its foundations, Beyond Horn clause logic, Equational logic, semantic and computational models, programming in BOBJ, Inductive logic programming, machine learning with first order logic, Temporal logic.

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7. **Course Name: Natural Language Processing**
   Course Code: CS606
   Credits: 3
   Course Contents: Natural language processing (NLP) seeks to endow computers with the ability to intelligently process human language. NLP components are used in conversational agents and other systems that engage in dialogue with humans, automatic translation between human languages, automatic answering of questions using large text collections, the extraction of structured information from text, tools that help human authors, and many, many more. This course will teach the fundamental ideas used in key NLP components. It is organized into several parts: Probabilistic language models, which define probability distributions over text passages, Text classifiers, which infer attributes of a piece of text by "reading" it, Sequence models, which transduce sequences into other sequences, parsing sentences into syntactic representations, semantics, which includes a range of representations of meaning, and Machine translation, which maps text in one language to text in another.

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8. **Course Name: Topics in Knowledge Representation & Reasoning: AI Automated Planning**
   Course Code: CS607
   Credits: 3
   Course Contents: Reasoning about action and change (RAC) is an area of research within the field of knowledge representation that looks at the formal foundations of reasoning about dynamical systems using logic and probabilities; Aspect of RAC that overlaps with cognitive robotics. The theory and algorithms applicable to a diversity of problems beyond the development of intelligent agents or cognitive robots, including software and hardware verification, genome sequencing, program synthesis, activity recognition, plan understanding, and automated monitoring and diagnosis.

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9. **Course Name: Advanced Algorithmic Graph Theory**
   Course Code: CS608
   Credits: 3
   Course Contents: In this course students study Vertex Orderings: st-Numbering and Canonical Orderings; Graph Decompositions and Their Algorithmic Applications: Ear Decomposition, Canonical Decomposition, Tree Decomposition, Path Width and Tree Width, PQ-tree, SPQR-tree,

Split Decomposition, Recursively Decomposable Graphs, Clique Separator Decomposition; Graph Representations: Implicit Representations, Intersection and Containment Representations; Graph Classes Defined by Forbidden Subgraphs; Graph Classes Defined by Elimination Schemes; Classes of Graphs with Bounded Tree width and Their Algorithmic Implications; Characterization, Construction and Recognition Algorithms for Some Special Classes of Graphs.

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10. Course Name: Theory of Quantum Information
Course Code: CS609
Credits: 3
Course Contents: Fundamentals of quantum information theory including states, measurements, operations, and their representations as matrices; measures of distance between quantum states and operations; quantum Shannon theory including von Neumann entropy, quantum noiseless coding, strong subadditivity of von Neumann entropy, Holevo's Theorem, and capabilities of quantum channels; theory of entanglement including measures of entanglement, entanglement transformation, and classifications of mixed-state entanglement; other topics in quantum information as time permits.

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11. Course Name: Deep Learning
Course Code: CS610
Credits: 3
Course Contents: This course provides an introduction to deep learning. Students taking this course will learn the theories, models, algorithms, implementation and recent progress of deep learning, and obtain empirical experience on training deep neural networks. The course starts with machine learning basics and some classical deep models, followed by optimization techniques for training deep neural networks, implementation of large-scale deep learning, multi-task deep learning, transferred deep learning, recurrent neural networks, applications of deep learning to computer vision and speech recognition, and understanding why deep learning works. The students are expected to have some basic background knowledge on calculus, linear algebra, probability, statistics and random process as a prerequisite.

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12. Course Name: Advanced Topics in Computer Graphics
Course Code: CS611
Credits: 3
Course Contents: This course will cover several advanced topics in computer graphics, listed below. Within each topic, after covering the relevant background, we will study some of the recent state-of-the-art research results. The topic include : Introduction , Construction of HDR radiance maps, Gradient domain high dynamic range compression: Fast bilateral filtering, Flash/no-flash photography, Poisson image editing; Smart selection, Smart selection, , and Poisson matting., Fluid dynamics simulations: stable fluids, Target-driven smoke animation, Physically based modeling and animation of fire, Animation of complex water surfaces, Basic concepts in topology and differential geometry, Parameterization methods, More parameterization, Geometry Images, Mesh compression, Laplacian mesh editing.

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13. Course Name: Advances in Computer Vision
Course Code: CS612
Credits: 3
Course Contents: Advanced topics in computer vision with a focus on the use of machine learning techniques and applications in graphics and human-computer interface are covered in this

course. It covers topics from early vision to mid- and high-level vision, including basics of machine learning and convolutional neural networks for vision. It covers image representations, texture models, structure-from-motion algorithms, monocular and stereo vision techniques, Bayesian techniques, object and scene recognition, Segmentation, tracking, shape modeling, and image databases. Applications may include face recognition, multimodal interaction, interactive systems, cinematic special effects, and photorealistic rendering. Applications to robotics and intelligent machine interaction are discussed.

14. **Course Name:** **Advanced Topics in Operating Systems**
Course Code: **CS613**
Credits: **3**
Course Contents: In this course students study advanced operating system topics and are exposed to recent developments in operating systems research. Topics Include Concurrent execution, Memory management using things like, virtual memory and memory allocations, Scalability such as lock-free data structures, File systems, Operating system architecture, Virtualization, Security such as data security, integrity and authentication, The history and experience of systems programming.

15. **Course Name:** **Data Compression**
Course Code: **CS614**
Credits: **3**
Course Contents: This course provides an overview of classical and modern techniques and algorithms of various types of data compression. It covers statistical and dictionary methods, lossless and lossy compression algorithms in graphics, video and audio compression. The course includes: Introduction to Information entropy: Entropy, Information Value, Data Redundancy. Statistical Methods: Shannon-Fano Algorithm, Huffman Algorithm, Adaptive Huffman Coding. Statistical Methods: Arithmetic Coding (Encoding, Decoding, Adaptive Coding). Dictionary Methods: LZ77, LZ78, LZW Algorithms. Image Compression: Discrete Cosine Transform, JPEG.6. Wavelet Methods: Discrete Wavelet Transform, JPEG 2000. Video Compression: Motion Compensation, Temporal and Spatial Prediction. MPEG and H.264. Audio Compression: Digital Audio, WAVE, FLAC, MPEG-1/2 Audio Layers.

16. **Course Name:** **Selected Topics in Computer Sciences** I
Course Code: **CS615**
Credits: **3**
Course Contents: This course covers the most recent research topics in Computer science research areas.

17. **Course Name:** **Selected Topics in Computer Sciences II**
Course Code: **CS616**
Credits: **3**
Course Contents: This course covers the most recent research topics in Computer science research areas.

18. **Course Name:** **Advanced Computer Architecture**
Course Code: **EE601**
Credits: **3**

Course Contents: This course introduces a survey of computer architecture fundamentals exemplified in commercially available computer systems, including classical CPU and control unit design, register organization, and primary memory organization and access, internal and external bus structures, and virtual memory schemes. This course discusses topics in the area of software and hardware exploitation of instruction-level parallelism (ILP), advanced processor pipelining, compiler techniques for exposing ILP, dynamic branch prediction, dynamic scheduling, hardware-based speculation, static scheduling, multi-threading, limitations of ILP, vector architecture, SIMD extensions, graphics processing units, loop level parallelism, memory hierarchy design, multiprocessor issues, and storage and interconnection. Evaluate performance of different architectures with respect to various parameters, analyze performance of different ILP techniques, and identify cache and memory related issues in multi-processors.

مقررات الدكتوراه في علوم الحاسب

كود المقرر	اسم المقرر	عدد الساعات المعتمدة
CS700	Advanced Topics in Distributed Computing	3
CS701	Advanced Artificial Intelligence	3
CS702	Arabic Language Processing	3
CS703	Advanced Compiler Constructions	3
CS704	Computational Geometry	3
CS705	Quantum Information Processing	3
CS706	Real-time Graphics Programming for Games	3
CS707	Applied Cloud Computing	3
CS708	Advanced Cryptography	3
CS709	Selected Topics in Computer Science I	3
CS710	Selected Topics in Computer Science II	3
IT700	Advanced Topics in Computer Networks	3
IT701	Advanced Network Security Topics	3
IT703	Network Performance Analysis and Simulations	3
IT704	Internet of Things (IoT)	3
MM701	Augmented Reality Systems	3
BNF704	Seminars in Bioinformatics II	3

1. **Course Name:** **Advanced Topics in Distributed Computing**
   Course Code: **CS700**
   Credits: **3**
   Course Contents: The focus of this course is service-oriented computing -- an emerging paradigm for distributed computing that is changing the way software is designed and delivered. A new interdisciplinary field known as Services Science is also emerging, and it combines social science, business, and engineering knowledge needed for organizations to succeed in the shift to service-based economy. Service-oriented computing, which promises business automation, will play an important role in Services Science. Web services, which are platform-independent computing elements that can be described, published, and discovered, represent the current technology based on service-oriented computing.

2. **Course Name:** **Advanced Artificial Intelligence**
   Course Code: **CS701**
   Credits: **3**

Course Contents: The course goes in depth on selected topics and methods within artificial intelligence (AI), machine learning (ML) and their applications. Examples include computational intelligence algorithms in search, optimization and classification, advanced pattern recognition, *neural networks*, expert systems and fuzzy systems, evolutionary computing, learning theory, constraint processing, logic programming, probabilistic reasoning, computer vision, speech processing, and natural language processing, which to a large extent consist of bio-inspired mechanisms. Examples of relevant applications include robotics, music, health and medicine.

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3. Course Name: Arabic Language Processing
Course Code: CS702
Credits: 3
Course Contents: This course familiarizes students with different theories and techniques of Arabic language processing. The course also shows challenges and potentials, Spoken Language Input, Written Language Input, Language Analysis and Understanding Language Generation, Spoken Output, Technologies Discourse and Dialogue Document Processing.

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4. Course Name: Advanced Compiler Constructions
Course Code: CS703
Credits: 3
Course Contents: The course familiarizes students with compilers, the course includes: implementation of high-level concepts (functional languages: closures, continuations, tail call elimination, object-oriented languages: object layout, method dispatch, membership test), optimizations, and run time support (interpreters and virtual machines, and memory management (including garbage collection).

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5. Course Name: Computational Geometry
Course Code: CS704
Credits: 3
Course Contents: Introduction to the design, analysis and application of algorithms for geometric problems. Topics include convex hull algorithms in two and three dimensions; Voronoi diagrams, Delaunay triangulations, and their applications; linear programming in low dimensions; line segments, planar subdivision, and polygons; range searching.

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6. Course Name: Quantum Information Processing
Course Code: CS705
Credits: 3
Course Contents: Review of basics of quantum information and computational complexity; Simple quantum algorithms; Quantum Fourier transform and Shor factoring algorithm: Amplitude amplification, Grover search algorithm and its optimality; Completely positive trace-preserving maps and Kraus representation; Non-locality and communication complexity; Physical realizations of quantum computation: requirements and examples; Quantum error-correction, including CSS codes, and elements of fault-tolerant computation; Quantum cryptography; Security proofs of quantum key distribution protocols; Quantum proof systems. Familiarity with theoretical computer science or quantum mechanics will also be an asset, though most students will not be familiar with both.

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7. Course Name: Real-time Graphics Programming for Games
Course Code: CS706

Credits: **3**

Course Contents: The objective of the course is to give an introduction to programming real-time graphics with C/C++ using a low-level graphics API such as OpenGL or DirectX. The course goes through modern rendering pipeline and its different stages, primitive transformation, depth buffering, programming shaders for the GPU (Graphics Processing Unit), polygon rasterization, texturing and sampling, lighting models and view frustum culling.

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8. **Course Name:** **Applied Cloud Computing**
Course Code: **CS707**
Credits: **3**

Course Contents: An application-oriented introduction to cloud computing. Basics of Service Oriented Architectures (SOA). Basic concepts of cloud computing such as virtualization and the service layers IaaS, PaaS and SaaS, dynamic provisioning, elasticity. Practical use of available public and private cloud stacks. Introduction to cloud security. Task based programming in cloud environments, distributed task queues such as Celery. Message brokers such as RabbitMQ.

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9. **Course Name:** **Advanced Cryptography**
Course Code: **CS708**
Credits: **3**

Course Contents: This course gives a thorough introduction to more advanced topics in modern cryptography, encompassing proper security models, cryptanalysis, implementations attacks and advanced functionalities such as computing on encrypted data, cryptocurrencies and post-quantum cryptography. The selected topics are as follows: Cryptanalytical algorithms, Provable security, Implementation attacks, Computing on encrypted data, Post-quantum cryptography, and Cryptocurrencies.

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10. **Course Name:** **Selected Topics in Computer Science I**
Course Code: **CS709**
Credits: **3**

Course Contents: This course covers the most recent research topics in computer science research areas.

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11. **Course Name:** **Selected Topics in Computer Science II**
Course Code: **CS710**
Credits: **3**

Course Contents: This course covers the most recent research topics in computer science research areas.

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12. **Course Name:** **Advanced Topics in Machine Learning**
Course Code: **CS711**
Credits: **3**

Course Contents: The course familiarizes students with the basics of machine learning, including, linear models, least-squares regression, maximum likelihood, regularization & cross-validation, classification, logistic regression, Deep learning, including, neural networks and convolutional neural networks, optimization, end-to-end learning, and recurrent networks.

مقررات الماجستير والدكتوراه في هندسة البرمجيات

مقررات الماجستير في هندسه البرمجيات

المقررات الاجبارية

كود المقرر	اسم المقرر	عدد الساعات المعتمدة
SE600	Software Requirements Engineering	3
SE601	Software System Design and Architecture	3

المقررات الاختيارية

كود المقرر	اسم المقرر	عدد الساعات المعتمدة
SE602	Software Testing & Quality Assurance	3
SE603	Secure Software Development	3
SE604	Software Maintenance and Evolution	3
SE605	Software Engineering for Distributed Systems	3
SE606	Selected Topics in Software engineering I	3
SE607	Selected Topics in Software engineering II	3
CS600	Advanced Topics in Machine Learning	3
CS602	Computational Complexity	3
CS603	Grid and Cloud Computing	3
CS604	Computability	3
CS605	Logic Programming System	3
CS607	Topics in Knowledge Representation & Reasoning: AI Automated Planning	3
CS609	Information Theory of Quantum	3
CS610	Deep Learning	3
CS611	Advanced Topics in Computer Graphics	3
CS612	Advances in Computer Vision	3
CS613	Advanced topics in Operating Systems	3
CS614	Data Compression	3
IS602	Big Data Analytics	3
IT600	Wireless Network	3
IT601	Modern Network Architectures and Implementation	3
IT602	Mobile and Distributed Computing	3
IT603	Network and Mobile Forensics	3
IT604	Cybersecurity	3
MM603	Multimedia Security	3
MM605	3D visual communications	3
MATH600	Advanced Probability and Statistics	3
EE600	Advanced Embedded Systems	3
EE601	Advanced Computer Architecture	3

1. **Course Name:** **Software Requirements Engineering**
   Course Code: **SE600**
   Credits: **3**
   Course Contents: This course describes the role of requirements in the construction and continued maintenance of large, complex and evolving software systems. It introduces the

important concepts and activities in systems requirements engineering, explains how they can knit together to form a through-life requirements engineering process, and demonstrates how such an end-to-end process can be defined and used in practice. The module provides a broad overview of the notations, techniques, methods and tools that can be used to support the various requirements engineering activities and complements this with the opportunity to gain experience in a selection of these. The module seeks to illustrate the wider applicability of requirements engineering to everyday projects, the breath of skills required and the many contributing disciplines.

2. **Course Name:** **Software System Design and Architecture**
   Course Code: **SE601**
   Credits: **3**
   Course Contents: This course covers the fundamental design principles and strategies for software architecture and design. Architectural styles, architecture-centric software design, modeling architectural design decision, architecture connectors, architecture analysis and implementation, applied architectures, designing non-functional properties, pattern-oriented design, component-oriented design, and interface design. An introduction to Service Oriented Architecture is also presented. The concepts of reusability, portability and robustness in design are also given in the course. Students participate in a group project on software design and architecture and design tools.

3. **Course Name:** **Software Testing & Quality Assurance**
   Course Code: **SE602**
   Credits: **3**
   Course Contents: This course focuses on learning about testing and other software quality assurance methods. While this is an advanced course the scope of the course contents is rather wide. This means that this course aims at giving you a good overall understanding of the various techniques and approaches to software quality building and assurance. You should learn the benefits and applicability of several techniques and approaches with the understanding of critically evaluate and assess the context specific merits and shortcomings of them. Thus, this course does not aim at providing you with specific technical skills for certain testing technologies, frameworks or tools, but gives you an opportunity to achieve deep learning of the role of testing and QA methods as part of software development processes. In the exercise work, however, you get an opportunity to study selected techniques or tools in more detail.

4. **Course Name:** **Secure Software Development**
   Course Code: **SE603**
   Credits: **3**
   Course Contents: This course covers the design and implementation of secure software. Some of the topics covered are the characteristics of secure software, the role of security in the development lifecycle, designing secure software, and best security programming practices. Security for web and mobile applications will be covered.

5. **Course Name:** **Software Maintenance and Evolution**
   Course Code: **SE604**
   Credits: **3**
   Course Contents: This course covers the foundations of software evolution and maintenance. This includes successful but aged software systems (i.e., legacy software), object-oriented

reengineering, refactoring, change patterns, empirical analysis of software, classification/prediction models, software quality analysis. We will also discuss analysis platforms and tools.

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6. **Course Name:** **Software Engineering for Distributed Systems**
   Course Code: **SE605**
   Credits: **3**
   Course Contents: The course aims to provide students with advanced understanding and analysis of engineering methods and techniques of distributed systems. Design and engineering principles of distributed systems. It includes in-depth study on how large-scale, distributed computational systems are designed and built, and mechanisms to evaluate them and the design considerations of Distributed Systems: Scalability, Openness, Heterogeneity, Concurrency, Fault-tolerance, Transparency, Performance and Management, It covers distributed software architectures, including transaction oriented, message oriented, with focus on design mechanisms and approaches for remote invocation, naming, synchronization, consistency and replication, and fault tolerance. The course places focus on the engineering of distributed systems and their applications within the context of real-world distributed systems, including cloud and grid computing.

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7. **Course Name:** **Selected Topics in Software engineering I**
   Course Code: **SE606**
   Credits: **3**
   Course Contents: This course covers the most recent research topics in software engineering research areas.

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8. **Course Name:** **Selected Topics in Software engineering II**
   Course Code: **SE607**
   Credits: **3**
   Course Contents: This course covers the most recent research topics in software engineering research areas.

مقررات الدكتوراه في هندسه البرمجيات

كود المقرر	اسم المقرر	عدد الساعات المعتمدة
SE700	Software Quality Engineering	3
SE701	Advanced Software Project Management	3
SE702	Model Driven Software Engineering	3
SE703	Business Process Re-engineering	3
SE705	Selected Topics in Software Engineering I	3
SE706	Selected Topics in Software Engineering II	3
CS701	Advanced Artificial Intelligence	3
CS703	Advanced Compiler Constructions	3
CS705	Quantum Information Processing	3
CS708	Advanced Cryptography	3
IS700	Advanced Big Data Analytics	3
IT701	Advanced Topics in Network Security	3
IT703	Network Performance Analysis and Simulations	3

1. **Course Name:** **Software Quality Engineering**
   Course Code: **SE700**
   Credits: **3**
   Course Contents: This course is designed to help improve your job performance and the quality of your company's software products. It is a broad course that addresses all of the body of knowledge area of the CSQE. It provides a thorough introduction for those new to software quality, as well as an opportunity to fill in any blank spots for experienced personnel. Knowledge of and/or work experience within the software quality assurance field is helpful but not required. Although not designed as a certification refresher, this course may help seasoned software quality professionals brush up on the key elements of CSQE.

2. **Course Name:** **Advanced Software Project Management**
   Course Code: **SE701**
   Credits: **3**
   Course Contents: The course will cover the details of what is required for project development via software engineering practices such as quality assurance, testing, evaluation, Introduction to Software Project Management, Overview of Project Planning, Project Evaluation, Selection of Appropriate Project Approach, Software Effort Estimation. Activity Planning. Risk Analysis and Management, Recourse Allocation, contact management, Managing People and Organizing Teams, Software Quality Assurance, Configuration Management.

3. **Course Name:** **Model-Driven Software Engineering**
   Course Code: **SE702**
   Credits: **3**
   Course Contents: Model-Driven Software Engineering is an approach for the architecture and development of software systems based on describing the different parts of the system using domain-specific models with formalized mappings between them in order to manage their complexity and improve their quality. This course introduces the idea of model-driven engineering, and teaches students how it can be used to develop and reason about systems, including the creation of tools for supporting modelling processes, and the use of model-based approaches for building and reasoning about software systems.

4. **Course Name:** **Business Process Re-engineering**
   Course Code: **SE703**
   Credits: **3**
   Course Contents: The objective of this course is to provide attendees with technical knowledge and practical training on the methodology and tools used for process reengineering. Attendees will gain an appreciation of the wide benefits of reengineering and learn how to achieve them through practical training and discussions of real case studies. The course includes Important Concepts, Identifying Improvement Opportunities, Improvement categories, Case examples, Understanding the process, Flowcharting, Analyzing the process, Computer applications in process analysis, Pre-project Stage, Analysis Stage, Vision Stage, Case studies, Design Stage, Transition Stage, Wrap up Stage, Case studies, Developing evaluation criteria , Change Management, Brainstorming- Improvement the case example, Discussion-Implementation issues, Concluding remarks.

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5. **Course Name:** **Selected Topics in Software engineering I**
   Course Code: **SE705**
   Credits: **3**
   Course Contents: This course covers the most recent research topics in software engineering research areas.

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6. **Course Name:** **Selected Topics in Software engineering II**
   Course Code: **SE706**
   Credits: **3**
   Course Contents: This course covers the most recent research topics in software engineering research areas.

مقررات الماجستير والدكتوراه في الوسائط المتعددة

مقررات الماجيستير في الوسائط المتعددة

المقررات الاجبارية

كود المقرر	اسم المقرر	عدد الساعات المعتمدة
MM600	Advanced Topics in Using Deep Learning for Multimedia	3
MM601	Advanced Topics in Game Programming	3

المقررات الاختيارية

كود المقرر	اسم المقرر	عدد الساعات المعتمدة
MM602	Multimedia Data Compression	3
MM603	Multimedia Security	3
MM604	Mobile Multimedia Systems	3
MM605	3D Visual Communications	3
CS600	Advanced Topics in Machine Learning	3
CS603	Grid and Cloud Computing	3
CS606	Natural Language Processing	3
CS607	Topics in Knowledge Representation & Reasoning: AI Automated Planning	3
CS608	Advanced Algorithmic Graph Theory	3
CS609	Theory of Quantum Information	3
CS610	Deep Learning	3
CS611	Advanced Topics in Computer Graphics	3
CS612	Advances in Computer Vision	3
CS613	Advanced topics in Operating Systems	3
CS614	Data Compression	3
IS600	Big Data Management	3
IS602	Big Data Analytics	3
IS603	Intelligent Information Retrieval Systems	3
IS604	Digital Education	3
IS607	Information Visualization	3
IT600	Wireless Network	3
IT601	Modern Network Architectures and Implementation	3
IT602	Mobile and Distributed Computing	3
IT603	Network and Mobile Forensics	3
IT604	Cybersecurity	3
SE600	Software Requirements Engineering	3
SE601	Software System Design and Architecture	3
MATH600	Advanced Probability and Statistics	3
EE600	Advanced Embedded Systems	3

1. **Course Name:** **Advanced Topics in Using Deep Learning for Multimedia**
   Course Code: **MM600**
   Credits: **3**
   Course Contents: Deep learning has been successfully explored in addressing different multimedia topics recent years, ranging from object detection to multimedia question

answering. This course focuses on using deep learning for multimedia retrieval (image search, video search, speech/audio search, music search, retrieval models, learning to rank), image/video understanding (object detection and recognition, localization, summarization, highlight detection, action recognition, multimedia event detection and recounting, semantic segmentation, tracking), vision and language (image/video captioning, visual question answering, image/video commenting, storytelling).

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2. **Course Name:** **Advanced Topics in Game Programming**
   Course Code: **MM601**
   Credits: **3**
   Course Contents: Deep learning has been successfully explored in addressing different multimedia topics recent years, ranging from object detection to multimedia question answering. This course focuses on using deep learning for multimedia retrieval (image search, video search, speech/audio search, music search, retrieval models, learning to rank), image/video understanding (object detection and recognition, localization, summarization, highlight detection, action recognition, multimedia event detection and recounting, semantic segmentation, tracking), vision and language (image/video captioning, visual question answering, image/video commenting, storytelling).

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3. **Course Name:** **Multimedia Data Compression**
   Course Code: **MM602**
   Credits: **3**
   Course Contents: This course covers the following topics: lossless compression, lossy compression, audio and speech compression, image compression, video coding standards, video coding techniques. Emphasis will be given to state-of-the-art multimedia coding standards, including JPEG/JPEG-2000, H.26x, and MPEG. Besides, considerations for constructing a video codec system will also be discussed. Also, the course focuses in research issues and recent developments of multimedia data compression.

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4. **Course Name:** **Multimedia Security**
   Course Code: **MM603**
   Credits: **3**
   Course Contents: This course intends to give in–depth knowledge in Multimedia security and to gain knowledge and hands-on experience about multimedia systems and security technologies, theories, research issues and recent developments of multimedia-based security systems such as digital watermarking methods and video surveillance.

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5. **Course Name:** **Mobile Multimedia Systems**
   Course Code: **MM604**
   Credits: **3**
   Course Contents: This course aims to introduce the concepts and the important issues in the design of mobile multimedia systems. Upon completion, students should be able to design mobile multimedia systems and evaluate the impact of different issues on the performance of mobile multimedia systems.

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6. **Course Name:** **3D Visual Communications**
   Course Code: **MM605**
   Credits: **3**

Course Contents: This course focuses on 3D modeling and representation, 3D content creation, 3D video compression, 3D content delivery, 3D display systems, 3D visual communications. The main concerns of this course deals with 3D graphics and rendering, 3DTV content processing procedure, 3D scene representation with explicit geometry, surface-based representation, point-based representation, volumetric-representation, construction and rendering 3D scene representation without geometry, depth construction, depth-image-based animation, 3D content capturing, 2D-to-3D video conversion, 3D video coding and standards, free-view point video, advanced 3D video streaming applications, multi-view video view switching, peer-to-peer 3D video streaming, and 3D video broadcasting.

مقررات الدكتوراه في الوسائط المتعددة

كود المقرر	اسم المقرر	عدد الساعات المعتمدة
MM700	Visualization	3
MM701	Augmented Reality Systems	3
MM702	Rendering Techniques	3
MM703	Advanced Multimedia Communications	3
MM704	Digital Libraries	3
MM705	Advanced Topics in Multimedia	3
MM706	Advanced Topics in Human Computer Interaction	3
CS700	Advanced Topics in Distributed Computing	3
CS701	Advanced Artificial Intelligence	3
CS702	Arabic Language Processing	3
CS705	Quantum Information Processing	3
CS706	Real-time Graphics Programming for Games	3
CS707	Applied Cloud Computing	3
CS708	Advanced Cryptography	3
IS700	Advanced Big Data Analytics	3
IT700	Advanced Topics in Computer Networks	3
IT702	Cloud Computing	3
IT704	Internet of Things (IoT)	3

1. **Course Name:** **Visualization**
   Course Code: **MM700**
   Credits: **3**

   Course Contents: This course covers techniques and algorithms for creating effective visualizations based on principles from graphic design, visual art, perceptual psychology, and cognitive science. The course includes building and evaluating visualization systems. Also, the course focuses on research issues and recent developments of visualization systems.

2. **Course Name:** **Augmented Reality Systems**
   Course Code: **MM701**
   Credits: **3**
   Course Contents: This course focuses on applying current and future technologies for the evaluation, implementation and operation of augmented reality systems. This course includes camera calibration, and tracking methods, open-source software tools that can be used to build augmented reality applications. Also, the course focuses in research issues and recent developments of augmented reality systems.

3. **Course Name:** **Rendering Techniques**
Course Code: **MM702**
Credits: **3**
Course Contents: Modern techniques used to generate synthetic three-dimensional images in a fraction of a second. With the advent of programmable shaders, a wide variety of new algorithms have arisen and evolved over the past few years. This course discusses current, practical rendering methods used in games and other applications. It also presents a solid theoretical framework and relevant mathematics for the field of interactive computer graphics, all in an approachable style. The course also includes advanced shading, global illumination, and curves and curved surfaces.

4. **Course Name:** **Advanced Multimedia Communications**
Course Code: **MM703**
Credits: **3**
Course Contents: This course covers advanced technologies for multimedia processing, coding, and communications. This course addresses how to efficiently represent multimedia data and how to deliver them over a variety of networks. In the aspect of multimedia networking, special considerations for sending multimedia over the Internet and wireless networks, such as video adaptation, error resilience, error concealment, and quality of service will be discussed.

5. **Course Name:** **Digital Libraries**
Course Code: **MM704**
Credits: **3**
Course Contents: This course addresses conceptual, practical, and technical issues, problems and approaches to digital libraries. The course offers a comprehensive overview of digital libraries, beginning with the issues of design, management and evaluation of digital libraries, such as project management, collection development, digitization, metadata, digital library applications, access and user interfaces, usability, and evaluation. The research literature addressing digital library development and evaluation is discussed. The practical experience of building a digital library provides an opportunity to develop useful skills for dealing with real-life issues in digital library projects.

6. **Course Name:** **Advanced Topics in Multimedia**
Course Code: **MM705**
Credits: **3**
Course Contents: The purpose of this course is to cover the various advanced concepts of hardware and software used in multimedia. Also, the course focuses on research issues and recent developments of multimedia.

7. **Course Name:** **Advanced Topics in Human Computer Interaction**
Course Code: **MM706**
Credits: **3**
Course Contents: This course covers topics such as Interactive systems, research areas in interaction techniques, and the design, prototyping, and evaluation of user interfaces, computer-supported cooperative work, audio, speech, and multimodal interfaces; user interface toolkits; mobile interfaces, design and evaluation methods; ubiquitous and context-aware computing; tangible interfaces, haptic interaction; analysis of human factors, ergonomics, accessibility standards, and cognitive psychology. Cognitive principles– perception, memory, problem solving,

etc. conceptual models, feedback, constraints, mapping, stages of action. The course surveys a wide range of psychological theories. It also covers new design methods and techniques available and the new conceptual mechanisms used in HCI such as the metaphors for describing user interaction.
