

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification

Applied Calculus (1)

MAT 113

Updated on March 2015

Course Specification

Institution: **Al-Imam Mohammad Ibn Saud Islamic University**

College/Department: **Mathematics and Statistics**

A. Course Identification and General Information

1. Course title and code: **Applied Calculus (1)** code: **MAT 113**

2. Credit hours: **4 (3, 2, 0)**

3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs)

- **B. Sc. In Computer Sciences**
- **Information Systems**

4. Name of faculty member responsible for the course

A faculty member

5. Level/year at which this course is offered: **Level 1/First Year**

6. Pre-requisites for this course (if any): **None**

7. Co-requisites for this course (if any): **None**

8. Location if not on main campus:

B. Objectives

<p>1. Summary of the main learning outcomes for students enrolled in the course. Creating a general background of differential calculus and Integral Calculus and its applications which is essential to proceed to next courses in all programs.</p>
<p>2. Briefly describe any plans for developing and improving the course that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field)</p> <ul style="list-style-type: none"> - The use of computers in the teaching process especially in materials that require it. - Creation a Website for the material especially for which that requires it. - Homework and assignments to be given in order to help the students to understand the course

2. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached)

1 Topics to be Covered		
List of Topics	No of Weeks	Contact hours
Limits and Continuity: The Concept of Limit, Computation of Limits, Continuity and its Consequences, Limits Involving Infinity, Asymptotes.	3 weeks	15 hours
Differentiation: Tangent Lines and Velocity, The Derivative, The Power Rule, The Product and Quotient Rules, The Chain Rules, Derivatives of Trigonometric Functions, Implicit Differentiation, The Mean Value Theorem, Derivatives of Exponential and Logarithmic Functions, Derivatives of Inverse Trigonometric Functions.	4 weeks	20 hours
Applications of Differentiation: Indeterminate Forms and Hopital's Rule, Maximum and Minimum Values, Increasing and Decreasing Functions, Concavity and the Second Derivative Test, Linear Approximations	4 weeks	20 hours
Integration Techniques: Anti-derivatives, Integration by Substitution, Area, Integration by Parts, The Definite Integral, The fundamental Theorem of Calculus.	4 weeks	20 hours

2 Course components (total contact hours per semester):				
Lecture:	Tutorial:	Laboratory	Practical/Field work/Internship	Other:
45 hours	30 hours			

<p>3. Additional private study/learning hours expected for students per week. (This should be an average: for the semester not a specific requirement in each week)</p> <p>5 hours per week</p>
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4. Development of Learning Outcomes in Domains of Learning

For each of the domains of learning shown below indicate:

- A brief summary of the knowledge or skill the course is intended to develop;
- A description of the teaching strategies to be used in the course to develop that knowledge or skill;
- The methods of student assessment to be used in the course to evaluate learning outcomes in the domain concerned.

a. Knowledge

- (i) Description of the knowledge to be

- **Acquire the fundamental concepts and basics knowledge of calculus.**
- **Get the intuitive knowledge of limits and continuity of a function.**
- **Find and interpret the derivative of functions.**
- **Study some applications of differentiation.**
- **Find and interpret the integral of functions.**

- (ii) Teaching strategies to be used to develop that knowledge

- **Three hours weekly containing lectures and examples.**
- **Two hours weekly of tutorial devoted to solve exercises and problems.**
- **Private Study including work on problem sheets and examination preparation.**
- **Students are encouraged to make regular visits during office hours where they can ask any questions about the course.**
- **Think and talk about problem solving and the underlying mathematical concepts.**

- (iii) Methods of assessment of knowledge acquired

- **Students will be evaluated on their ability to devise, organize and present complete solutions to problems. While instructors may design their own methods of evaluating student performance, these methods must include in class examinations, frequent homework assignments and a final exam.**

b. Cognitive Skills

- (i) Description of cognitive skills to be developed

- **Find a limit (numerically, graphically and analytically).**
- **Calculate derivatives of complicated functions.**
- **Apply differentiation and numerical differentiation to problems such as related rates, graphing and optimization.**
- **Manipulate the integration techniques theoretically and numerically.**
- **Develop techniques of problem solving.**
- **Pursue later courses in calculus.**

- (ii) Teaching strategies to be used to develop these cognitive skills

- **Self-study is an important method for students' learning.**
- **Tell the students why they are learning something, how they will use it, and why it is**

important.

- **Introduce some concepts by examples from real-life problems.**
- **Encourage Students to communicate their mathematical thinking, and to work cooperatively with their peers to develop individual skills.**
- **Ability to ask and answer questions as they arise.**
- **Dialogue between teachers' team to review courses and exams.**

(iii) Methods of assessment of students cognitive skills

- **Questions in Lectures.**
- **Short Quizzes and Exams.**
- **Participation through Classwork and Homework.**

c. Interpersonal Skills and Responsibility

(i) Description of the interpersonal skills and capacity to carry responsibility to be developed

- **Capacity to reflect on the meaning of the material.**
- **Participate in class by asking questions and by giving answers to the teacher.**
- **Ability to carry out calculations orally and mentally.**
- **The students must prepare the sheet of exercises that will be solved in class and they should be responsible for their own learning.**
- **Ability to communicate more effectively with peers and teaching staff.**
- **Students can work together, but should not simply copy work from each other.**

(ii) Teaching strategies to be used to develop these skills and abilities

- **Making lectures accessible by giving the students a copy of slides to share.**
- **Teachers verbalize everything they write on an overhead or whiteboard and precise with their language.**
- **Motivate the students to ask questions; and to give response to the teacher's questions.**
- **Encourage the students to solve the exercises on whiteboard.**
- **Adopting an educative approach to plagiarism.**

(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility

- **Oral test of students.**
- **Homeworks, Quizzes and Exams.**
- **Giving marks for Participation in the class.**

d. Communication, Information Technology and Numerical Skills

▪ (i) Description of the skills to be developed in this domain.

- **Students will have the ability to communicate mathematics clearly and precisely both orally and in writing.**
- **Have the ability to carry out complex calculations orally and mentally**
- **By solving problems the students will collaborate and develop verbal and written skills.**
- **The use of electronic mail and Network skills in communicating with the others and in submitting homeworks and assignments.**

<ul style="list-style-type: none"> ▪ (ii) Teaching strategies to be used to develop these skills <ul style="list-style-type: none"> - Lectures delivered in traditional manner and/or visualized by slides. - Encourage the students to use electronic mail and Network skills in submitting homeworks and assignments. - Encourage the students to be self-starters and to finish the mathematical problems properly. - Introduce several courses in English which will require reading, writing, and oral presentation. - Introduce courses in computer application and programming which will prepare students to use available software and develop simple programs.
<p>(iii) Methods of assessment of students numerical and communication skills</p> <ul style="list-style-type: none"> - Calculation exercises in Tests, Quizzes, and Exams. - Giving marks for Participation in Lectures and Tutorial. - Marks given for Assignments and Presentations in all courses will include a component for effectiveness of presentation.
e. Psychomotor Skills (if applicable)
<p>(i) Description of the psychomotor skills to be developed and the level of performance required</p> <ul style="list-style-type: none"> - Not applicable.
<p>(ii) Teaching strategies to be used to develop these skills</p> <ul style="list-style-type: none"> - Not applicable.
<p>(iii) Methods of assessment of students psychomotor skills</p> <p>Not applicable.</p>

5. Schedule of Assessment Tasks for Students During the Semester			
Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	Midterm 1	Around 6th -7th week	20 %
2	Midterm 2	Around 11th -12th week	20 %
3	Quizzes, Attendance, Participation and Homeworks	All the semester	20 %
4	Final Exam	Around 15th -16th week	40 %

3. Student Support

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| <p>1. Arrangements for availability of teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)</p> <ul style="list-style-type: none">- There are 6 office hours per week reserved by each professor, planed on his timetable, to help the students on their problems.- Each student will be assigned an academic advisor who will act as a mentor, providing academic and career advice, and general counselling. |
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4. Learning Resources

<p>1. Required Text(s)</p>

<p>Calculus, Early Transcendental Functions, 3rd edition, Robert T. SMITH and Roland B. MINTON, McGraw-Hill.</p>

<p>2. Essential References</p>

<p>"Essential Calculus with Applications" by Richard A. Silverman, Dover Publications (A plethora of Integral Calculus books)</p>

<p>3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List)</p>

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| <ul style="list-style-type: none">- Calculus, O. Swokowski, et al, PWS Pub. Co.; 6th edition (1994).- Calculus Early Transcendentals, C. Henry Edwards, David E. Penney, Prentice Hall, 2008.- Schaum's Outline of Calculus, Elliott Mendelson, Frank Ayres, McGraw-Hill, 1999. |
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<p>4- Electronic Materials, Web Sites etc</p>

<p>Internal server: \\10.10.70.70\ScienceShareFolder http://mathworld.wolfram.com/</p>

<p>5- Other learning material such as computer-based programs/CD, professional standards/regulations</p>
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5. Facilities Required

<p>Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)</p>

<p>1. Accommodation (Lecture rooms, laboratories, etc.)</p>

<p>- Each classroom is equipped with PC and retro projector with a maximum of 50 students.</p>

<p>2. Computing resources</p>

<p>- The computers are equipped with different software's.</p>

<p>3. Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list)</p>
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6. Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- **At the end of the course each student will complete an evaluation form which it will be used by the faculty to evaluate the course feedback and the instructor.**
- **Meet with department heads to review and discuss the evaluation issues and the level of students.**

2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department

- **Participating collaboratively in faculty improvement activities and contributing to collegial decision making.**
- **At the end of each semester the course coordinator completes a report, including a summary of student questionnaire responses appraising progress and identifying changes that need to be made if necessary.**

3 Processes for Improvement of Teaching

- **Students evaluation;**
- **Course report;**
- **Workshops on effective teaching methods to enable instructors to improve their teaching skills;**
- **Benchmarking with similar programs in Saudi and International Universities.**

4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution)

- **Coordination with the girls section as partners: content of course, discussion about the exams and the level of students.**
- **Collaboration with the teaching staff members in each student's educational process, including information about student achievement and performance.**
- **Check a sample of marking by independent faculty member.**

5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

Twice annually following the Teaching and Learning Assessment Process adopted by the Department Council.

Approved by Department of Mathematics and Statistics Council No.:6 Date: **October 21, 2014 - Thul-Hijjah 27, 1435**

Approved by College of Science Council No.: **5 (22/36)** Date: **November 20, 2014 - Muharram 27, 1436**

	<i>Name</i>	<i>Signature</i>	<i>Date</i>
<i>Faculty/Teaching Staff (who prepared the form)</i>	For the Department Quality Committee (Dr. Abdelouahed EL KHALIL)		October 19, 2014 - Thul-Hijjah 25, 1435
<i>Program Chair/ Department Head</i>	Dr. Abdullah ALJOUIEE		October 21, 2014 - Thul-Hijjah 27, 1435
<i>College Vice Dean for Quality and Development</i>	Dr. Raed ALHATHLOOL		November 23, 2014 - Safar 1, 1436
<i>College Dean</i>	Dr. Mohammed BABATIN		November 23, 2014 - Safar 1, 1436