| QF04/0408-4.0E | Course Plan for Bachelor program - Study Plan Development and Updating Procedures/ Department of basic science |
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|---|---|---|---|---|---|
| **Study plan No.** | **2024/2025** | | **University Specialization** | | **Bachelor of Mathematics** |
| **Course No.** | **0420802** | | **Course name** | | **Calculus (2) for Eng.** |
| **Credit Hours** | **3** | | **Prerequisite/ Co-requisite** | | **Calculus (1) (0101101)** |
| **Course type** | ☐ MANDATORY UNIVERSITY REQUIREMENT | ☐ UNIVERSITY ELECTIVE REQUIREMENTS | ☐ FACULTY MANDATORY REQUIREMENT | ☐ Support course family requirements | ✓ **Mandatory requirements** / ☐ Elective requirements |
| **Teaching style** | ☐ Full online learning | | ☐ Blended learning | | ✓ **Traditional learning** |
| **Teaching model** | ☐ 1 Synchronous: 1 asynchronous | | ☐ 1 face to face : 1 asynchronous | | ✓ **2 Traditional** |

## Faculty member and study divisions' information (to be filled in each semester by the subject instructor)

| Name | Academic rank | Office No. | Phone No. | E-mail | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| **Division number** | **Time** | **Place** | **Number of students** | **Teaching style** | **Approved model** |
| | | | | | |
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## Brief description

Inverse functions, Inverse trigonometric functions, Hyperbolic and inverse hyperbolic functions, L'Hopital rule, Methods of integration, Improper integrals, Applications of integrals (Area, Volume, Arc length, Surface area), Introduction to sequences and series.

## Learning resources

| | | | | |
|---|---|---|---|---|
| Course book information (Title, author, date of issue, publisher ... etc) | Calculus, 10th edition By Howard Anton, Irl Bivens and Stephen Davis. | | | |
| Supportive learning resources (Books, databases, periodicals, software, applications, others) | 1-CALCULUS, 10th Edition, by Finney and Thomas.<br>2-Calculus: One and Several Variables, Salas, John Wiley, 10th Edition (2006)<br>3-Vector Calculus" Susan Colley. Pearson Prentice Hall, 3rd Edition (2006) | | | |
| Supporting websites | • Calculus at S.O.S. Mathematics<br>• http://www.sosmath.com/calculus/calculus.html<br>• Visual Calculus; tutorials and demos<br>• http://archives.math.utk.edu/visual.calculus/index.html<br>• Calculus online<br>• http://www.ugrad.math.ubc.ca/coursedoc/math100/index.html<br>• Online tutorials and quizzes<br>• http://www.math.hmc.edu/calculus/tutorials/ | | | |
| The physical environment for teaching | ✓ Class room | ☐ labs | ☐ Virtual educational platform | ☐ Others |

| | |
|---|---|
| Necessary equipment and software | |
| Supporting people with special needs | |
| For technical support | |

## Course learning outcomes (S= *Skills, C= Competences K= Knowledge,)*

| No. | Course learning outcomes | The associated program learning output code |
|---|---|---|
| | **Knowledge** | |
| **K1** | Define exponential, logarithmic, inverse trigonometric and hyperbolic functions. | **MK 1** |
| **K2** | Apply the rules of differentiation to find the derivative of exponential, logarithmic, inverse trigonometric and hyperbolic functions. | **MK 2** |
| **K3** | Evaluate the integration of functions involving exponential, logarithmic, inverse trigonometric and hyperbolic functions. | **MK 3** |
| **K4** | Identify improper integrals and compute their values when they are convergent. | **MK 1** |
| **K5** | Define the sequences and the series. | **MK 2** |
| **K6** | Evaluate the sum of series if its convergent. | **Mk 3** |
| | **Skills** | |
| **S1** | Specify the type of integration which can be used to find the integration of functions involving exponential, logarithmic, inverse trigonometric and hyperbolic functions. | **MS 4** |
| **S2** | Test a series for convergence or divergence | **MS 4** |
| **S3** | Classify the type of a series. | **MS 3** |
| | **Competences** | |
| **C1** | Cooperate to work effectively in the group assignments. | **MC 1** |
| **C2** | Develop the individual's ability to communicate and interact with other mathematical courses. | **MC 2** |

## Mechanisms for direct evaluation of learning outcomes

| Type of assessment / learning style | Fully electronic learning | Blended learning | Traditional Learning (Theory Learning) | Traditional Learning (Practical Learning) |
|---|---|---|---|---|
| Mid Exam | 30% | 30% | **30%** | 30% |
| Participation / practical applications | 0 | 0 | **20%** | 30% |
| Asynchronous interactive activities | 30% | 30% | **0** | 0 |
| Final exam | 40% | 40% | **50%** | 40% |

## Schedule of simultaneous / face-to-face encounters and their topics

| Week | Subject | learning style | Reference |
|---|---|---|---|
| **1** | Review of Indefinite and Definite Integrals.<br>Inverse Functions and their derivatives. Exponential and | Lecture 1+2 | 302 – 324<br>51 – 89 |

| | | | |
|---|---|---|---|
| | Logarithmic Functions. | | 447 – 453 |
| **2** | L'Hopital's Rule | Lecture 3 +4 | 467 – 476 |
| **3** | Inverse Trigonometric Functions. Derivatives and Integrals Involving Inverse Trigonometric Functions | Lecture 5+6 | 488 – 498 |
| **4** | Hyperbolic Functions, Derivatives of Hyperbolic Functions. | Lecture 7+8 | 498 – 509 |
| **5** | Inverse Hyperbolic Functions and Their Derivatives. Inverse Hyperbolic Functions In Terms of Integrals. | Lecture 9 +10 | 509 – 514 |
| **6** | Integration by Parts | Lecture 11 +12 | 514 – 526 |
| **7** | Solving exercises. | Lecture 13+14 | |
| **8** | Trigonometric Integrals **Mid Exam** | Lecture 15+16 | 526 – 534 |
| **9** | Integration by Trigonometric Substitutions | Lecture 17+18 | 534 – 541 |
| **10** | Integration by Partial Fractions | Lecture 19+20 | 541 – 549 |
| **11** | Improper Integrals Volumes of solids of Revolution | Lecture 21+22 | 573 – 586 388 – 403 |
| **12** | Examples on solids by revolving lines parallel to x-axis or y-axis. Arc Length. Area of a Surface of Revolution | Lecture 23+24 | 388 –403 |
| **13** | Arc Length. Area of a Surface of Revolution Integral test. Ratio and root test. Comparison Test. Limit comparison test. | Lecture 25+26 | 403 – 409 |
| **14** | Power series. Taylor and Maclaurin series. | Lecture 27+28 | 647 – 670 |
| **15** | Power series. Taylor and Maclaurin series. | Lecture 29+30 | 679 – 698 |
| **16** | **Final Exam** | | |