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| images (1).jpg | **North South University**  **Department of Mathematics and Physics**  **MAT-130 : Calculus and Analytical Geometry II**  **Course Outline**  **Fall 2022** |

**Course Name** : **Calculus and Analytical Geometry - II** [*Integral Calculus*]

**Course Code** : MAT 130

**Credit Hours** : 3 Credit

**Pre-requisite** : MAT 120

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| **Instructor** | : -------- |
| **Office** | : SAC \*\*\*\* |
| **Email:** | : -----[@northsouth.edu](mailto:hasina.akter@northsouth.edu) |
| **Office Time**  **Course Short Description:** | : --------  This course provides students an overview of the basic principle of integral, methodology of finding area between curves, length of a plane curve, surface area and volume by revolving plane curves using integration. |
| **Course**  **Objectives:**  **Course Learning Outcomes:** | 1. To classify different types of proper and improper integrals and find the appropriate techniques for finding values of integrals, and to analyse the area of bounded and unbounded regions.  2. To analyse the basic geometric properties of conic sections parabolas, ellipses, and hyperbolas.  3. To demonstrate student’ understanding of the relationship between the exponential and hyperbolic functions, their graphs and the application of hyperbolic functions in the real-life problems.  4. To develop the ability to apply the basic principles of integration to find the length of a curve, surface area of revolution, area between two curves and the volume of solids generated by revolution of curves.  Upon successful completion of this course, students will be able to:  **(CO-1)** Classify the type of a given integral and apply the appropriate technique for finding the value of the integral.  **(CO-2)** Formulate and evaluate integrals to find the length of curves, the area between curves, the area of unbounded regions, and the area of surfaces of revolution.  **(CO-3)** Analyze the structure of solids generated by revolution of a region bounded by curves to evaluate volume.  **(CO-4)** Illustrate parametric curves and conic sections, and analyze their various properties.  **(CO-5)** Develop the ability to apply polar coordinates to find the area of regions bounded by polar curves.  **Mapping of Course Outcomes** |

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| **#** | **Course Outcomes (CO)** | **Bloom’s taxonomy**  **domain/level**  *(***C***: Cognitive*  **P***: Psychomotor*  **A***:Affective)* | **Delivery methods**  **and activities** | **Assessment**  **tools** |
| **CO-1** | Classify the type of a given integral and apply the appropriate technique for finding the value of the integral. | **C2, C3** | |  | | --- | | Lecture  Group work | | |  | | --- | | Quiz  Midterm exam  Class performance | |
| **CO-2** | Formulate and evaluate integrals to find the length of curves, the area between curves, the area of unbounded regions, and the area of surfaces of revolution. | **C3, C4, P2** | |  | | --- | | Lecture Group work | | |  | | --- | | Midterm exam  Assignment | |
| **CO-3** | Analyze the structure of solids generated by revolution of a region bounded by curves to evaluate volume. | **C3, C4, P2** | Lecture  Discussion   |  | | --- | |  | | Group work in class  Quiz  Assignment |
| **CO-4** | Illustrate parametric curves and conic sections, and analyze their various properties. | **C4, P2** | Lecture  Discussion | Assignment  Final Exam |
| **CO-5** | Develop the ability to apply polar coordinates to find the area of regions bounded by polar curves. | **C2, C3, P2** | Lecture | Quiz  Assignment  Final Exam |

**Marks Distribution**: **(Subject to change according to the directives from UGC/NSU/DMP)**

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| Assessment Strategy and Grading Scheme | |
| **Grading tool** | **Marks** |
| Attendance | 10% |
| Assignments (At least 3) | 10% |
| Quizzes (At least best 2 out of 3) | 15% |
| Midterm | 30% |
| Final Exam | 35% |

**Text Book:**

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| **Author** | Howard Anton, Irl Bivens, Stephen Davis |
| **Title** | “Calculus, Early Transcendentals**”** |
| **Edition & Year** | 10th edition, soft copy (2013) |
| **Publisher** | John Wiley & Sons, Inc |
| **ISBN** | 978-1-11809240-8 |

**Grading Policies**: As per NSU grading policy.

### Important dates:

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| Midterm | TBA |

Course Final TBA

**Rules and Restrictions:**

1. Submit the assignments on recommended date. **No late submission will be accepted**. Make a photocopy of your assignment before submission.
2. There is **no scope to retake a quiz**. In case of Mid-term, exceptional cases\* (unfortunate physical inability, accidents, serious illness) may be considered conditionally (with a **penalty of 20% reduced marks**) with proper justification. Date of final exam will be strictly followed.
3. Three consecutive absents need an official clarification.
4. Student having attendance **less than 60% of total classes will not be allowed to sit for Final Exam**.
5. If you are a **probation/retake student**, you must attend all 24 classes. Please study even harder to improve your CGPA. Your instructor and the TA will be helping you to overcome your difficulties.

Classroom Rules of Conduct:

1. Electronic devices e.g**. cell phone**, **laptop, notepad, iPad, iPod, mp3, etc** are strictly prohibited in the class.

1. It is imperative that the students maintain absolute discipline in class. Students are also expected to arrive on time for the class, as frequent late attendance will not be accepted.

**Academic Integrity Policy:** Department of Mathematics and Physics does not tolerate academic dishonesty by its students. At minimum, students must not be involved in cheating, copyright infringement, submitting the same work in multiple courses, significant collaboration with other individuals outside of sanctioned group activities, and fabrications.

Students are advised that violations of the Student Integrity Code will be treated seriously, with special attention given to repeated offences.

**Please Refer to NSU Student Handbook, Sections: “Disciplinary Actions” and “Procedures and Guidelines”.**

**Course Contents & Lecture Schedule:**

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| **Lesson** | ***Topics*** | | | | **Learning activities** | **Assessment tools** | **Learning Outcome** |
| 1 | 7.2: Integration by parts | | | | Lecture | Class performance 1 | CO-1 |
| 2 | 7.3: Trigonometric integrals | | | | Lecture | Quiz 1, Mid-1  Assignment | CO-1 |
| 3 | 7.3: Trigonometric integrals | | | | Lecture | Quiz 1, Mid-1  Assignment | CO-1 |
| 4 | 7.4: Trigonometric substitution | | | | Lecture  Group Activities | Quiz 1, Mid-1 | CO-1 |
| 5 | 7.5: Integrating rational functions by partial fractions | | | | Lecture | Quiz 1, Mid-1 | CO-1 |
| 6 | 7.5: Integrating rational functions by partial fractions | | | | Lecture | Mid-1  Assignment | CO-1 |
| 7 | 6.9: Hyperbolic functions and hanging cables | | | | Lecture | Class performance 2 | CO-1 |
| 8 | 6.9: Hyperbolic functions and hanging cables | | | | Lecture | Mid-1 | CO-1 |
| 9 | 6.1: Area between two curves | | | | Lecture | Quiz 2, Mid-2 | CO-2 |
| 10 | 6.2: Volumes by slicing disks | | | | Lecture | Quiz 2, Mid-2 | CO-3 |
| 11 | 6.2: Volumes by slicing washers | | | | Lecture | Quiz 2, Mid-2  Assignment | CO-3 |
| 12 | 6.3: Volumes by Cylindrical shells | | | | Lecture  Group Activities | Quiz 2, Mid-2 | CO-3 |
| 13 | **Midterm** | | | |  |  |  |
| 14 | 6.4: Length of a plane curves | | | | Lecture | Mid-2, Class performance 3 | CO-2 |
| 15 | 6.5: Area of a surface of revolution | | | | Lecture | Mid-2, Class performance 3 | CO-2 |
| 16 | 7.8: Improper Integrals | | | | Lecture | Final, Quiz 3 | CO-1, CO-2 |
| 17 | 7.8: Improper Integrals | | | | Lecture,  Group Activities | Final  Assignment | CO-1, CO-2 |
| 18 | 10.1: Tangent lines and arc length for parametric curves | | | | Lecture | Final, Class performance 4 | CO-4 |
| 19 | 10.2: Polar coordinates, Area in polar coordinates | | | | Lecture | Final, Quiz 3  Assignment | CO-5 |
| 20 | 10.3: Area in polar coordinates | | | | Lecture | Final, Quiz 3 | CO-5 |
| 21 | 10.4: Conic sections, parabola, ellipse | | | | Lecture  Group Activities | Final | CO-4 |
| 22 | 10.4: Conic sections ellipse, hyperbola | | | | Lecture | Final | CO-4 |
| 23 | 10.6: Conic sections in polar coordinates | | | | Lecture | Final, Assignment | CO-4 |
| 24 |  | |  | ***Review*** | | | |
|  |  | ***Final Exam (Declared by Controller of Examinations)*** | | | | | |

**Note: 7.3 and the concepts of finding area and volume will be included with the final exam syllabus**

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*Thank You \*\*\*\*\*\*\*\*\*\*\***