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|----------------|--|-----------------|--|
| Faculty | Faculty of Engineering | | |
| Program | B.Sc. in Civil Engineering | Required | |
| | B.Sc. in Computer Engineering | Required | |
| | B.Sc. in Electrical-Electronics Engineering | Required | |
| | B.Sc. in Industrial Engineering | Required | |
| | B.Sc. in Mechanical Engineering | Required | |

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|---|---|-------------------|--------------------|-------------------|
| Course Code | MATH 115 | | | |
| Course Title in English | Calculus I | | | |
| Course Title in Turkish | Diferansiyel ve İntegral Hesap I | | | |
| Language of Instruction | English | | | |
| Type of Course | Flipped Classroom/Lecture/Exercise | | | |
| Level of Course | Undergraduate | | | |
| Course Category (by % of Content) | Basic Science | Basic Engineering | Engineering Design | General Education |
| | 100 | - | - | - |
| Semester Offered | Fall | | | |
| Contact Hours per Week | Lecture: 4 hours | Recitation: - | Lab:- | Other:- |
| Estimated Student Workload | 176 hours | | | |
| Number of Credits | 7 ECTS | | | |
| Grading Mode | Standard Letter Grade | | | |
| Pre-requisites | None | | | |
| Expected Prior Knowledge | None | | | |
| Co-requisites | None | | | |
| Registration Restrictions | Only Undergraduate Students | | | |
| Overall Educational Objective | To acquire a basic knowledge and understanding of important concepts of differentiation and integration of a single variable. | | | |
| Course Description | This course provides a comprehensive introduction to some fundamental aspects of function of a single variable, trigonometric functions, limit, continuity of a function, differentiation of a single variable function, extremum of a function, mean value theorem, L'Hospital's rule, antiderivative and the indefinite integral, definite integrals, fundamental theorem of calculus, applications of the definite integral, the exponential and logarithmic function, the inverse trigonometric functions, hyperbolic functions and their inverses, integration techniques. | | | |
| Course Description in Turkish | Bu derste; diferansiyel ve integral hesabın temel kavramları şu konu başlıklar altında kapsamlı bir şekilde incelenmektedir: Tek değişkenli fonksiyonlar, trigonometrik fonksiyonlar, limit, süreklilik, tek değişkenli fonksiyonların türevi, bir fonksiyonun ekstremum değerleri, ortalama değer teoremi, L'Hospital kuralı, antitürev ve belirsiz integral, belirli integral, diferansiyel ve integral hesabın esas teoremi, belirli integralin uygulamaları, üstel fonksiyon, logaritma, ters trigonometrik fonksiyonlar, hiperbolik fonksiyonlar ve ters hiperbolik fonksiyonlar, integral teknikleri. | | | |
| Course Learning Outcomes and Competences | Upon successful completion of the course, the learner is expected to: <ol style="list-style-type: none"> 1. calculate limit at a point and limit at infinity of single variable functions; 2. solve applied optimization extrema problems and sketch graphs of functions; 3. evaluate definite and indefinite integrals using integration techniques; 4. apply definite integrals for calculating arc-lengths, volumes, area of surface of revolution, center of mass and moments of inertia; 5. calculate, differentiate and integrate exponential functions, logarithmic functions, trigonometric and inverse trigonometric functions and hyperbolic and inverse hyperbolic functions. | | | |

| Relationship of the Course with the Student Outcomes | Level | Learning Outcome(s) | Assessed by |
|--|---|--|---|
| Student Outcomes | N=None S=Supportive H=High | | Exam, Project, HW, Experiment, Presentation, etc. |
| (1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics | H | 1 - 5 | Exams, Flipped Learning |
| (2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors | | | |
| (3) an ability to communicate effectively with a range of audiences | | | |
| (4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts | | | |
| (5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives | | | |
| (6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions | | | |
| (7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies | | | |
| Prepared by and Date | Prof. Dr. Can Fuat Delale / September 2019 | | |
| Semester | Fall 2019-2020 | | |
| Name of Instructor | Dr. Onur Şeker ; Dr. Ilker Arslan | | |
| Course Contents | Week | Topic | |
| | 1. | Function of a single variable, trigonometric functions | |
| | 2. | Limit and continuity | |
| | 3. | The derivative of a function | |
| | 4. | Applications of the derivative | |
| | 5. | Curve sketching and L'Hospital's rule | |
| | 6. | Antiderivative, the indefinite and definite integral | |
| | 7. | The fundamental theorem of calculus | |
| | 8. | Applications of definite integrals | |
| | 9. | Applications of definite integrals | |
| | 10. | Inverse of a function. Transcendental functions: Logarithmic and exponential functions | |
| | 11. | Transcendental functions: Inverse trigonometric functions | |
| | 12. | Transcendental functions: Hyperbolic and inverse hyperbolic functions | |
| | 13. | Integration techniques: Integration by parts, integration by partial fractions | |
| | 14. | Integration techniques: Trigonometric integrals, trigonometric substitutions | |
| | 15. | Final Exam/Project/Presentation Period | |
| | 16. | Final Exam/Project/Presentation Period | |
| Required/Recommended Readings | Thomas' Calculus, 13th Ed., G. Thomas, M. Weir, J. Hass, F. Giordano, Pearson/ Addison Wesley, 2016 | | |
| Teaching Methods | Lectures/contact hours using "flipped classroom" as an active learning technique | | |
| Homework and Projects | Review questions as homework | | |
| Laboratory Work | - | | |
| Computer Use | - | | |

| Other Activities | - | | | | | | | | | | | | | | | | | | | | | |
|--|---|----------------------------|--------|-----------|---------------|---|----------------------------|---------------------|------|----|----------------------------|-------|----|--|----|---|------------|---|----|-------|--|-----|
| Assessment Methods | <table border="1"> <thead> <tr> <th>Types of assessment</th> <th>Number</th> <th>Ratio (%)</th> </tr> </thead> <tbody> <tr> <td>Midterm Exams</td> <td>2</td> <td>40 (each contributing 20%)</td> </tr> <tr> <td>Pearson Assignments</td> <td>8-10</td> <td>10</td> </tr> <tr> <td>Flipped Classroom Practice</td> <td>24-28</td> <td>10</td> </tr> <tr> <td>Watching the videos and taking online test</td> <td>22</td> <td>5</td> </tr> <tr> <td>Final Exam</td> <td>1</td> <td>35</td> </tr> <tr> <td>Total</td> <td></td> <td>100</td> </tr> </tbody> </table> | Types of assessment | Number | Ratio (%) | Midterm Exams | 2 | 40 (each contributing 20%) | Pearson Assignments | 8-10 | 10 | Flipped Classroom Practice | 24-28 | 10 | Watching the videos and taking online test | 22 | 5 | Final Exam | 1 | 35 | Total | | 100 |
| Types of assessment | Number | Ratio (%) | | | | | | | | | | | | | | | | | | | | |
| Midterm Exams | 2 | 40 (each contributing 20%) | | | | | | | | | | | | | | | | | | | | |
| Pearson Assignments | 8-10 | 10 | | | | | | | | | | | | | | | | | | | | |
| Flipped Classroom Practice | 24-28 | 10 | | | | | | | | | | | | | | | | | | | | |
| Watching the videos and taking online test | 22 | 5 | | | | | | | | | | | | | | | | | | | | |
| Final Exam | 1 | 35 | | | | | | | | | | | | | | | | | | | | |
| Total | | 100 | | | | | | | | | | | | | | | | | | | | |
| Course Administration | <p>Instructor's office and phone number: 5th Floor, Room#518 Office hours: Arslan: Wednesday 13:00- 15:00. Şeker: Thursday 13:00-14:00 Email address: arslanil@mef.edu.tr , sekeron@mef.edu.tr Rules for attendance: Classroom participation contributes to 15% of the final grade. Missing a midterm: Provided that proper documents of excuse are presented, each missed midterm by the student will be given the grade of the final exam. No make-up will be given. Students will not be accommodated for two midterm examination. Missing a final: Faculty regulations. A reminder of proper classroom behavior, code of student conduct: YÖK Regulations Statement on plagiarism: YÖK Regulations (http://www.mef.edu.tr/tr/yonetmelikler)</p> | | | | | | | | | | | | | | | | | | | | | |

| ECTS Student Workload Estimation | Activity | No/Weeks | Hours | | | Calculation | Explanation |
|----------------------------------|-----------------------------------|---------------------------|--------------------------------|----------------------------------|--|-------------|-------------|
| | | No/Weeks per Semester (A) | Preparing for the Activity (B) | Spent in the Activity Itself (C) | Completing the Activity Requirements (D) | | |
| | Lecture/Flipped Class | 14 | 2 | 4 | 2 | 112 | A*(B+C+D) |
| | Quizzes | 2 | 6 | 1 | | 14 | A*(B+C+D) |
| | Midterm(s) | 2 | 12 | 2 | | 28 | A*(B+C+D) |
| | Assingment, Project, Presentation | | | | | 0 | A*(B+C+D) |
| | Final Examination | 1 | 20 | 2 | | 22 | A*(B+C+D) |
| | Total Workload | | | | | 176 | |
| | Total Workload/25 | | | | | 7.04 | |
| | ECTS | | | | | 7 | |