Syllabus – CALCULUS 2

Kode Mata Kuliah (*Course Code*): **TIF104**	**Nama Mata Kuliah** (*Course Name*): **CALCULUS 2**		
Program Studi (*Study Program*): **Informatics**	**Fakultas** (*Faculty*): **Engineering and Computer Science**		
Mata Kuliah Pra-Syarat (*Course Pre-requisite*): **Calculus 1**	**Kredit** (*Credit*): **2**		
	Kuliah (*Lecture*): **2**	**Tutorial**: –	**Praktikum** (*Practicum*): –
Revisi (*Revision Status*): **2.0**	**Semester**: Genap/Even **Tahun Akademik**: 2015/2016		
Lecturer's Name: Irwan Prasetya Gunawan			

COURSE DESCRIPTION

This course will cover the intermediate-level calculus materials: sequence and series, first-order differential equations, second-order differential equations, vector-valued functions, partial derivatives, multiple integrals, and integration in vector fields.

COURSE OBJECTIVES

Upon completion of this course, the student should be able to:

- Understand the foundation of sequence and series and use them in various applications such as proofing convergence of power series
- Understand and solve first-order and second-order differential equations applied to various problems related to electrical circuit analysis
- Understand the concept of vector-valued functions and prepare them for later materials such as partial derivatives, gradient vector, and line integrals including their applications
- Understand the concept, properties, and computational aspects of double and triple integrals and its applications to masses and moments

METHODS OF INSTRUCTIONS

Classroom instruction consists of lectures and practical problem solving, supplemented by visual aids designed to assist the student to successfully meet the courses learning objectives.

It is imperative that students take an active interest in the course. To succeed in this course, students must read, think, and write in a critical and analytical manner and this takes time and practice. Such practice can only be achieved by working exercises. When troubles arise, and they will, the student must ask questions which may be directed to the instructor or other students in a variety of ways.

Students are also encouraged to work together on problem sets as part of their exercises. However, individual must ultimately demonstrate the understanding of the material by writing up his/her own solutions without the help of other students or their written work.

On average students need to spend roughly, at least, 6 hours of study and preparation per week for this course.

ATTENDANCE REQUIREMENT

Comply with academic rules. Punctuality and regular attendance in classes is of prime importance for successful completion of this course. Students will be expected to arrive for class on time and to remain in class until the end of the class session.

Absence from lectures shall not exceed 22%. Students who exceed the 22% limit without a medical or emergency excuse acceptable to and approved by the Dean of the Faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course.

ASSESSMENT

Coursework evaluation will be weighted as follows:

- Mid Semester Test: 30%
- Final Semester Test: 40%
- Others (class participation, Assignments/quiz/pretest): 30%

MATERIAL REFERENCES AND REQUIRED SUPPLIES

Textbooks:

[1] George B. Thomas, Maurice D. Weir, Joel R. Hass; Thomas Calculus 12th Ed.; Pearson Education, Inc., 2010.

COURSE OUTLINE

Note: all materials are delivered by means of in-class lectures and class room discussions. Chapters in the references refer to [1].

Session	Topics & Sub-Topics	Methods	References	Assignment
1	Sequence: (a) Sequence (b) Integral test (c) Comparison tests (d) Ratio and root tests	Lecture, Discussion	Ch. 10.1, 10.3–10.5	Probs: 1-18 (even)
2	Infinite series: (a) Infinite series (b) Alternating series (c) Convergence (d) Power series (e) Taylor and Maclaurin series (f) Binomial series	Lecture, Discussion	Ch. 10.2, 10.6–10.10	Ch 10 Problems 19-22, 30-33, 43-45, 52-55, 66, 71-74
3	First order differential equations: (a) First-order linear equations (b) Slope fields (c) Direct method (d) Substitution methods (e) Integrating factor (f) Eulers method	Lecture, Discussion	Ch. 9.1-9.3	Ch 9 Problems 1, 5, 8, 13, 16, 19, 21, 23, 27, 30, 31
4	Applications of first-order differential equations:	Lecture, Discussion	Ch. 9.4-9.5	Ch 9 Problems 35, 36
5	Second order differential equations: (a) Homogeneous equation (b) Characteristics equation (c) Homogenous solution	Lecture, Discussion	Ch. 17.1-17.2	Sec. 17.1 No. 4, 16, 28, 36, 42, 50, 56. Sec. 17.2 No. 2, 6, 10, 16, 18, 22, 28, 32,34, 46, 52
6	Second order differential equations (cont'd): (a) Non-homogenous equation (b) Solution through undetermined coefficients (c) Solution through parameters variations	Lecture, Discussion	Ch. 17.3-17.5	Sec. 17.3 No. 4, 8, 12, 16, 18, 22. Sec. 17.4 No. 2, 6, 14, 18, 20, 22. Sec. 17.5 No. 2, 4, 6, 10, 14
7	Review: (a) Complex number (b) Vectors (c) Reviews for exams	Lecture, Discussion	Ch. 9,10,17	
MID SEMESTER TEST				

8	Vector valued functions: (a) Vectors, products (b) Curves in space and tangents (c) Integral of vector functions (d) Applications and examples	Lecture, Discussion	Ch. 12.2–12.4, 13.1, 13.2, 13.3-13.5	Ch. 12 Problems 2, 7, 10, 14, 18, 22, 26, 30, 34, 44, 50, 56, 60. Ch. 13 Problems 2, 4, 12, 16, 22. Ch. 13 Problems 6, 10, 16, 26, 30, 34
9	Partial derivatives: (a) Functions of several variables (b) Limits and continuity in higher dimensions (c) Partial derivatives (d) Chain rules (e) Directional derivatives and gradient vectors	Lecture, Discussion	Ch. 14.1-14.5	Ch. 14 Problems 1,5,8, 14, 17, 18, 21, 24, 26, 31, 35, 39, 42
10	Applications of partial derivatives: (a) Tangent planes and differentials (b) Extreme values and saddle points (c) Lagrange multipliers	Lecture, Discussion	Ch. 14.6-14.8	Ch. 14 Problems 45, 48, 55, 61, 65, 72, 81, 90, 92, 96
11	Multiple integrals: (a) Double integral over rectangles and general regions (b) Triple integrals in rectangular coordinates (c) Area by double integration (d) Moments and center of mass (e) Substitutions in multiple integrals	Lecture, Discussion	Ch. 15.1–15.3, 15.5–15.8	Ch. 15 Problems 2, 6, 12, 14, 18 Ch. 15 Problems 24, 26, 28, 30
12	Line integrals: (a) Line integrals and vector fields (b) Path independence (c) Conservative fields (d) Potential functions (e) Greens Theorem	Lecture, Discussion	Ch. 16.1-16.4	Ch. 16 Problems 2, 4, 7, 9, 10
13	Surface integrals: (a) Surfaces and area (b) Surface integrals (c) Stokes Theorem (d) Divergence Theorem	Lecture, Discussion	Ch. 16.2, 16.5–16.8	Ch. 16 Problems 13, 14, 18, 21, 26
14	Reviews and exam preparations	Lecture, Discussion	Ch. 12–16	
FINAL SEMESTER TEST				

Prepared by:
Name: Irwan Prasetya Gunawan
Position: Lecturer
Date: April 10, 2016

Certified by:
Name: Hoga Saragih
Position: Head of Department
Date