THE UNIVERSITY of ADELAIDE

Course Profile

PURE MTH 3022 GEOMETRY OF SURFACES III

1. GENERAL COURSE INFORMATION

1.1 COURSE DETAILS

Course Code: PURE MTH 3022 **Course:** Geometry of Surfaces III
Coordinating Unit: The School of Mathematical Sciences

Term: Semester 2 **Year:** 2011 **Mode:** Internal
Level:
Location/s: North Terrace
Units: 3
Contact: 36 hours of lectures and tutorials

Prerequisites: MATHS 1012 or 2105
Corequisites: None
Incompatible: None
Assumed Knowledge: MATHS 2101 or MATHS 2202
Restrictions: None
Quota: None

Course Description:
The geometry of surfaces is a classical subject which remains important today in fields as diverse as string theory and nano-materials. From a mathematical perspective it provides an excellent introduction to the ideas of contemporary Riemannian geometry. Topics covered are: The inverse and implicit function theorems; submanifolds of R^n; differential forms; Stokes' Theorem for submanifolds of R^n. Curvature of curves and surfaces in R3; geodesics. The Gauss-Bonnet theorem. Surfaces of zero gaussian curvature; minimal surfaces.

1.2 COURSE STAFF

Course Coordinator: Prof Michael Murray
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Office: Innova 21, Rm 729
Phone: 8303 4174
Administrative Enquiries: School of Mathematical Sciences Office, Level 7 Innova 21

1.3 COURSE TIMETABLE

Lectures
Tuesday, 2-3pm, Engineering & Mathematics, EMG06, Math Seminar Room 1
Wednesday, 1-2pm, Engineering Annex, 314, Lecture Room
Friday, 2-3pm, Innova21, B21, Teaching Suite

The full timetable of all activities for this course can be accessed from the Course Planner at https://access.adelaide.edu.au/courses/search.asp

2. LEARNING OBJECTIVES

2.1 COURSE LEARNING OBJECTIVES

Students who successfully complete the course should:

1. Understand basic topology and differentiation in R^n
2. Understand and be able to apply the inverse and implicit function theorems
3. Understand and be able to work with submanifolds in their various forms
4. Understand and be able to calculate with the geometry of curves
5. Understand and be able to calculate with the geometry of surfaces
6. Understand integration on surfaces and be able to calculate such integrals
7. Understand the Gauss-Bonnet theorem and be able to apply it

2.2 UNIVERSITY GRADUATE ATTRIBUTE(S)

This course will provide students with an opportunity to develop the Graduate Attribute(s) specified below:

UNIVERSITY GRADUATE ATTRIBUTE	COURSE LEARNING OBJECTIVE(S)
Knowledge and understanding of the content and techniques of a chosen discipline at advanced levels that are internationally recognised.	all
The ability to locate, analyse, evaluate and synthesise information from a wide variety of sources in a planned and timely manner.	
An ability to apply effective, creative and innovative solutions, both independently and cooperatively, to current and future problems.	all
Skills of a high order in interpersonal understanding, teamwork and communication.	
A proficiency in the appropriate use of contemporary technologies.	
A commitment to continuous learning and the capacity to maintain intellectual curiosity throughout life.	
A commitment to the highest standards of professional endeavour and the ability to take a leadership role in the community.	
An awareness of ethical, social and cultural issues within a global context and their importance in the exercise of professional skills and responsibilities.	

3. LEARNING RESOURCES

3.1 REQUIRED RESOURCES

None

3.2 RECOMMENDED RESOURCES

1. Manfredo de Carmo: Differential Geometry of Curves and Surfaces. 514.75 C287
2. John A. Thorpe: Elementary topics in differential geometry. 514.7 T519e

3. Peter Baxandall and Hans Liebeck: Vector calculus. 517.2 B355v
4. Martin Lipschutz: Schaum's outline of theory and problems of differential geometry. 513.73 L767
5. Alfred Gray: Modern differential geometry of curves and surfaces. 514.7 G778m
6. Wendell Fleming: Functions of several variables. 517.53 F598.2

3.3 ONLINE LEARNING

This course uses MyUni exclusively for providing electronic resources, such as lecture notes, assignment papers, sample solutions, discussion boards, etc. It is recommended that the students make appropriate use of these resources. Link to MyUni login page: https://myuni.adelaide.edu.au/webapps/login/

4. TEACHING & LEARNING ACTIVITIES

4.1 TEACHING & LEARNING MODES

This course relies on lectures as the primary delivery mechanism for the material. Tutorials supplement the lectures by providing exercises and example problems to enhance the understanding obtained through lectures. A sequence of written assignments provides the assessment opportunities for students to gauge their progress and understanding.

4.2 WORKLOAD

The information below is provided as a guide to assist students in engaging appropriately with the course requirements.

Activity	Quantity	Workload Hours
Lectures	30	90
Tutorials	6	18
Assignments	6	48
Totall		156

4.3 LEARNING ACTIVITIES SUMMARY

Lecture Outline

1. Introduction and review of topology on R^n (2 lectures)
2. Differentiable functions on R^n (5 lectures)
3. Inverse and implicit function theorems (3 lectures)
4. Submanifolds (4 lectures)
5. Curves (3 lectures)
6. Surfaces (3 lectures)
7. Integration on submanifolds (7 lecture)
8. Gauss-Bonnet theorem (3 lectures)

Tutorial Outline

1. Topology and differentiation in R^n
2. Inverse and implicit function theorems
3. Submanifolds
4. Curves and surfaces
5. Integration on submanifolds
6. Gauss Bonnet theorem and review

4.4 SPECIFIC COURSE REQUIREMENTS

None

5. ASSESSMENT

The University's policy on Assessment for Coursework Programs is based on the following five principles: 1) assessment must encourage and reinforce learning; 2) assessment must measure achievement of the stated learning objectives; 3) assessment must enable robust and fair judgements about student performance; 4) assessment practices must be fair and equitable to students and give them the opportunity to demonstrate what they have learned; and 5) assessment must maintain academic standards (see: http://www.adelaide.edu.au/policies/700/)

5.1 ASSESSMENT SUMMARY

Component	Weighting	Objective Assessed
Assignments	15%	all
Exam	70%	all
Test	15%	all

5.2 REQUIREMENTS

Aggregate score of at least 50%

5.3 ASSESSMENT DETAIL

Assessment Item	Distributed	Due Date	Weighting
Assignment 1	29 Jul 2011	9 Aug 2011	3%
Assignment 2	12 Aug 2011	23 Aug 201	3%
Assignment 3	26 Aug 2011	6 Sep 2011	3%
Assignment 4	9 Sep 2011	20 Sep 2011	3%
Assignment 5	23 Sep 2011	18 Oct 2011	3%
Test	14 Sep 2011	14 Sep 2011	15%

5.4 SUBMISSION

1. All written assignments are to be submitted to the designated hand in boxes within the School of Mathematical Sciences with a signed cover sheet attached.
2. Late assignments will not be accepted.
3. Assignments will have a two week turn-around time for feedback to students.

5.5 COURSE GRADING

Grades for your performance in this course will be awarded in accordance with the following scheme:

M10 (Mark Scheme)

Grade	Mark	Description
FNS		Fail No Submission
F	1-49	Fail
P	50-64	Pass
C	65-74	Credit
D	75-84	Distinction
HD	85-100	High Distinction

Further details of the grades/results can be obtained from:
http://www.adelaide.edu.au/student/exams/

Grade Descriptors are available which provide a general guide to the standard of work that is expected at each grade level (see: http://www.adelaide.edu.au/policies/700/)

Final results for this course will be made available through Access Adelaide (https://access.adelaide.edu.au/sa/login.asp)

FREE TEXT ENTRY: Areas may choose to provide additional information e.g. on re-marking of assessment or supplementary examination/assessment

6. STUDENT FEEDBACK

The University places a high priority on approaches to learning and teaching that enhance the student experience. Feedback is sought from students in a variety of ways including on-going engagement with staff, the use of online discussion boards and the use of Student Experience of Learning and Teaching (SELT) surveys as well as CEQ surveys and Program reviews.

SELTs are an important source of information to inform individual teaching practice, decisions about teaching duties, and course and program curriculum design. They enable the University to assess how effectively its learning environments and teaching practices facilitate student engagement and learning outcomes. Under the current SELT Policy (http://www.adelaide.edu.au/policies/101/) course SELTs are mandated and must be conducted at least once every 2 years. Feedback on issues raised through course SELT surveys is made available to enrolled students through various resources (e.g. MyUni). In addition aggregated course SELT data can be found at: http://www.adelaide.edu.au/clpd/selt/aggregates/

FREE TEXT ENTRY: If applicable, areas must report on changes to the course as a result of feedback (e.g. through recent surveys such as course SELTs)

7. STUDENT SUPPORT

Academic Support	Maths, writing and speaking skills	http://www.adelaide.edu.au/clpd/students/
Counselling Service	Personal counselling for issues affecting study	http://www.adelaide.edu.au/counselling_centre/
International Student Care	Ongoing support	http://www.international.adelaide.edu.au/support/isc/
Student Care	Advocacy, confidential counselling, welfare support and advice	http://www.auu.org.au/site/page.cfm?u=69
Students with a Disability	Alternative academic arrangements	http://www.adelaide.edu.au/disability/
	Alternative Examination Arrangements Policy	http://www.adelaide.edu.au/policies/63/
	Reasonable Adjustments to Teaching & Assessment for Students with a Disability Policy	http://www.adelaide.edu.au/policies/64/

8. POLICIES & GUIDELINES

This section contains links to relevant assessment-related policies and guidelines. All University Policies can be obtained from: http://www.adelaide.edu.au/policies/

Academic Honesty and Assessment Obligations for Coursework Students policy and Academic Dishonesty Procedures	http://www.adelaide.edu.au/policies/230/
Assessment for Coursework Programs	http://www.adelaide.edu.au/policies/700/
Copyright	http://www.adelaide.edu.au/policies/2643/
Examinations	http://www.adelaide.edu.au/policies/465/
Student Grievance Resolution Process	http://www.adelaide.edu.au/student/grievance/
Unsatisfactory Academic Progress by Coursework Students	http://www.adelaide.edu.au/policies/1803/