



School of Civil and Environmental Engineering

Term 2, 2021

GMAT3700 GEODETIC POSITIONING AND APPLICATIONS

COURSE DETAILS

Units of Credit 6

Contact hours

This course aims to introduce you to:

- (a) Fundamentals of Modern Geodesy, its applications & technologies, as well as how it is organised at a global, international level (IAG, IGS, GGOS)
- (b) Review of Australian datums and contemporary international datums
- (c) Precise GPS/GNSS positioning, including observation modelling & data processing
- (d) Practical procedures for GPS/GNSS, including fieldwork and computations using Leica Infinity
- (e) Precise GPS/GNSS positioning modes: Static, RTK, CORS, SBAS, PPP, NRTK, Multi-GNSS
- (f) Datum modernisation issues for precise GPS/GNSS positioning, especially in Australia
- (g) Standards and Practices for control surveying with GNSS and directions.
- (h) Enable the student to research an associated topic in this space and present it to the class.

COURSE PROGRAM

Week No. (Strt Wk)	Lectures (2 hrs) Wednesday 10 – 12 am CE101	Lectures (2 hrs) Friday 12 – 2 pm CE101	Workshop (2 hrs) Friday 2 – 4 pm CE201
1 (31 May)	Intro to the course/ admin (1) Revision of datums (2) GDA Tech manual revision + professional associations (3) CE G8	Modern geodetic technologies, the IAG & GGOS; Space geodetic applications (4,5) Presentation (due 29 Jul)	Wkshp 1: Mapping exercise* GDA assignment** (due 11 June)
2 (7 Jun)	Principles of satellite orbital motion (6) Revision of GPS (7)	Introduction to GPS signals & measurements (8) Analysis of Least squares GPS measurement modelling (9)	Wkshp 2: Planning software and online services, precise orbits*
3 (14 Jun)	GPS Carrier Phase based positioning, DD (10)	GPS Errors (11) Introduction to GPS baseline processing (12)	
4 (21 Jun)	Planning & executing surveys (13)	From baselines to networks (14) RINEX (& other) formats (15)	Wkshp 3: Download RINEX data and investigate*

5
(28 Jun)

GNSS Heighting (16)

Class exercise Prac

TEACHING STRATEGIES

A variety of teaching activities will be included to achieve the optimal teaching and learning outcomes. Major teaching activities in this course are:

- 1) Weekly lectures – Live in CE101 and online with BBCU
- 2) Field exercise on campus
- 3) Quizzes, hands-on workshops & discussions
- 4) Class presentation
- 5) Final examination

The lectures will provide the foundation to the course. Students are encouraged to come to lectures live and interact and ask questions. The workshops, computational exercises, field exercise/ processing and quizzes/exam are intended to address the basic objectives of the course. The critical review and class presentation encourage the student to indulge in one specialist area of the course.

The most important factors in learning are the students' commitment and learning methods. Participation is everything. In addition, relevant resources on the web are of great help in understanding the basic concepts of GPS/GNSS positioning discussed in the lectures. An important component of this course will be based on the actual design of a static GPS field exercise, and the processing of the data collected.

ASSESSMENT

Assessment for the course consists of:

- Workshops and mini-quizzes: 22% (2 +2 +2 +2 +4 +2 +2 +2 +4)
- o (Wkp 1, 2, 3, prac planning, 5, Quiz 1, 2, 3 and GDA tech manual exercise)

Final Examination

The final examination will cover all topics related to precise positioning and modern geodesy.

Note: "Supplementary Examinations for Term 2 2021 will be held on Monday 6th – Friday 10th September (inclusive) should you be required to sit one. You are required to be available during these dates. Please do not to make any personal or travel arrangements during this period."

