Description: Survey Computations B

<table>
<thead>
<tr>
<th>Subject</th>
<th>Cat-Nbr</th>
<th>Class</th>
<th>Term</th>
<th>Mode</th>
<th>Units</th>
<th>Campus</th>
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<tr>
<td>SVY</td>
<td>2105</td>
<td>15172</td>
<td>2, 2002</td>
<td>EXT</td>
<td>1.00</td>
<td>TWMBA</td>
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Academic Group: FOENS
Academic Org: FOES05
HECS Band: 2
ASCED Code: 031101

STAFFING
Examiner: Kevin McDougall
Moderator: Frank Young

PRE-REQUISITES
Pre-requisite: SVY 2106

RATIONALE
This course provides students with the necessary skills to collect, analyse and adjust survey measurement data for a variety of applications. The Least Squares technique is normally used to calculate adjusted values and precision indicators, with the results presented in one or more coordinate systems.

SYNOPSIS
A view of statistical theory is followed by its application to the analysis and adjustment of survey observations using Least Squares method. Both manual methods, using hand held programmable calculators, and computer software packages are used to process the data from a variety of practical problems. Students are taught to analyse and understand the results of adjustments. The course examiners the adjustment of terrestrial and GPS observations, coordinate transformations and computations on the UTM Map Grid.

OBJECTIVES
On completion of this course, students should be able to:
- apply statistical concepts and techniques to the adjustment and analysis of survey data;
- mathematically adjust survey networks by the method of least squares, using both manual methods and computer software packages;
- analyse the stochastic model to determine the degree of precision of a survey;
complete computations on the ATM map grid.

TOPICS

<table>
<thead>
<tr>
<th>Description</th>
<th>Weighting (%)</th>
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<tbody>
<tr>
<td>1. REVIEW OF RELEVANT STATISTICAL CONCEPTS Precision and accuracy, theory of errors, normal distribution, confidence limits, rejection criteria, T-Test, Fishers F-Test, Chi Square Test.</td>
<td>10.00</td>
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<tr>
<td>2. INTRODUCTION TO LEAST SQUARES ADJUSTMENT Functional Models, linear and non linear, Stochastic Model, Concept of Weights, the Law of Propagation of Variances, Least Square description, curve fitting Linear Regression, Redundant Observations, Parametric Method of Least Squares, Limitations of Method.</td>
<td>15.00</td>
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<tr>
<td>3. LEAST SQUARES APPLICATION 1-Dimensional network (Levelling); 2-D network (traverse, EDM calibration); 3-D network (GPS) networks). Coordinate Transformations</td>
<td>40.00</td>
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<tr>
<td>4. ANALYSIS OF OBSERVATIONS Variance - Covariance matrices, &quot;a priori&quot; and &quot;a posteriori&quot; variance factors, correlation, error ellipses.</td>
<td>15.00</td>
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<tr>
<td>5. OPTIMISATION OF NETWORKS Analysis of different results from different computer softwares.</td>
<td>5.00</td>
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<tr>
<td>6. COMPUTATIONS ON THE AUSTRALIAN MAP GRID (AMG) and MAP GRID AUSTRALIA (MGA) Properties of AMG and MGA, bearings, azimuth, arc to chord correction, transformation of coordinates of one system to another (eg WGS 84 to AMG coordinates) using established transformation parameters, zone to zone transformations.</td>
<td>15.00</td>
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TEXT and MATERIALS required to be PURCHASED or ACCESSED:

Books can be ordered by fax or telephone. For costs and further details use the 'Book Search' facility at http://bookshop.usq.edu.au by entering the author or title of the text.


REFERENCE MATERIALS

Reference materials are materials that, if accessed by students, may improve their knowledge and understanding of the material in the course and enrich their learning experience.

Harvey, B. R. 1991, *Practical Least Squares and Statistics for Surveyors*, Monograph 13, School of Surveying, UNSW,


STUDENT WORKLOAD REQUIREMENTS

ACTIVITY       HOURS
Assessment     50
Directed Study 48
Examinations   3
Private Study  54

ASSESSMENT DETAILS

<table>
<thead>
<tr>
<th>Description</th>
<th>Marks Out of</th>
<th>Wtg(%)</th>
<th>Required</th>
<th>Due Date</th>
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<tr>
<td>ASSIGNMENT 1</td>
<td>250.00</td>
<td>25.00</td>
<td>Y</td>
<td>02 Sep 2002</td>
</tr>
<tr>
<td>ASSIGNMENT 2</td>
<td>250.00</td>
<td>25.00</td>
<td>Y</td>
<td>14 Oct 2002</td>
</tr>
<tr>
<td>3 HOUR OPEN EXAMINATION</td>
<td>500.00</td>
<td>50.00</td>
<td>Y</td>
<td>END S2</td>
</tr>
</tbody>
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NOTES:
3. Student Administration will advise students of the dates of their examinations during the semester.

OTHER REQUIREMENTS

1. To receive a passing grade in this course a student must normally achieve at least 45% in each of the assessments and at least 50% of the available marks for the course.
2. A minimum standard of communication skills must be demonstrated in order for a passing grade to be achieved.
3. The due date for an assignment is the date by which a student must submit the assignment to the USQ. The onus is on the student to provide proof of the submit date, if requested by the Examiner.
4. Students must retain a copy of each item submitted for assessment. This must be produced within five days if required by the Examiner.
5. In accordance with University's Assignment Extension Policy (Regulation 5.6.1), the examiner of a course may grant an extension of the due date of an assignment in extenuating circumstances.
6. If students submit assignments after the due date without prior approval then a penalty of up to 20% of the total marks for the assignment will apply for each working day late.
7. In the event that a due date for an assignment falls on a local public holiday in their area, such as a Show holiday, the due date for the assignment will be the next day. Students are to note on the assignment cover the date of the public holiday for the Examiner's convenience.
8. The Faculty of Engineering and Surveying will NOT accept submission of hand written or typed assignments by facsimile, e-mail or computer diskette. Students...
in remote locations who do not have regular access to postal services may be given special consideration.

9 The final grades for students will be assigned on the basis of the aggregate of the marks obtained for each of the assessments in the course.

10 An open examination indicates that the candidate may have access to any material during the examination except the following: electronic communication devices, bulky materials, laptop computers, devices requiring mains power and material likely to disturb other students.

11 The Faculty of Engineering and Surveying does not offer supplementary examinations.

12 Students who have undertaken all of the required assessments in a course but who have failed to meet some of the specified objectives of a course within the normally prescribed time may be awarded the temporary grade: IM (Incomplete - Make up). An IM grade will only be awarded when, in the opinion of the examiner, a student will be able to achieve the remaining objectives of the course after a period of non-directed personal study.

13 Students who, for medical, family/personal, or employment-related reasons, are unable to complete an assignment or to sit for an examination at the scheduled time may apply to defer an assessment in a course. Such a request must be accompanied by appropriate supporting documentation. One of the following temporary grades may be awarded IDS (Incomplete - Deferred Examination; IDM (Incomplete Deferred Make-up; IDSM (Incomplete Deferred Examination and Make-up).