York University
Faculty of Science and Engineering

SC/EATS 3640 4.0 and SC/ENG 3140 4.0

Geodetic Surveys

Winter 2008

Course Director

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Lectures

Tuesdays, 15:00 – 18:00 (3:00p.m. – 6:00p.m.)
The Engineering Lab (Petrie Sci. and Eng. Building, Room 020)

Laboratory exercises

Fridays, 09:00-12:00.
The Engineering Lab (Petrie Sci. and Eng. Building, Room 020)

Assessment

Laboratories	45%
Mid-term test	15%
Participation	5%
Final Exam	35%

Attension: Students, who miss maximum 3 lab assignments for any reason, will automatically prevent from passing this course without exception.

Grade System

≥90%	A+
80-89%	A
75-79%	B+
70-74%	B
65-69%	C+
60-64%	C
55-59%	D+
50-54%	D
40-49%	E
<39%	F

GENERAL COURSE INFORMATION

1. Objectives

- Familiarization with high precision survey instrument systems.
- Gain knowledge and skills in testing and calibrating of survey instruments according to standards and specifications.
- Establishing high precision geodetic control for special purpose engineering projects.
- Applying geodetic theory in high precision monitoring networks.
- Acquiring knowledge and skills on the establishment and measurement of special purpose monitoring networks for a variety of engineering applications.
- Developing skills in data collection, processing, analysis and interpretation via advanced and complex calculations and computer programming.

2. Format

Since every individual responds to different stimuli in his or her learning process, the presentation of the material will be done in a variety of ways. All of them will require work on your part to be effective. We will take a participative approach to learning. This means that faculty and students learn **together** by doing. We will learn **with** each other and **from** each other. **Therefore, we are all responsible for being prepared for class:**

- Lecture sessions will be conducted in form of discussion and participation. Students are required to participate actively, and design and solve problems by synthesizing knowledge, experience and skills from previous courses.
- The course will be closely related and will be running parallel to SC/ENG3130 4.0 "*Analysis of overdetermined systems*."
- Each session will normally commence with a brief review of the concepts treated previously. New subject(s) will be presented immediately after the review, according to the tentative lecture schedule provided in this handout. **Participation** is an essential element of learning: It will be **encouraged** and **assessed**.
- All sessions will based on, but not limited to the advanced topics of the textbook. Technical papers will also be supplied by the instructor for further studies. The students will be required to actively search relevant literature to further their knowledge.

3. Laboratory and field exercises

- Laboratories are most essential for the development of skills and experience. They will comprise a variety of activities that are usually required in the design, planning, execution, analysis and interpretation of data, and preparation of comprehensive reports.
- Laboratory exercises will be conducted in the lab and in the field depending on weather conditions.
- Laboratory reports will have clear due dates. You are expected to describe in detail methodologies, data processing and analysis, and results and hand in reports and developed software, where applicable.
- Participation in all laboratory exercises is **mandatory**.
- Grades for late laboratory reports will be decreased by 20% per day for each day overdue. Late lab reports must be handed in personally to your TA.

4. Getting feedback on your progress

Feedback on your progress will be provided in four different ways:

- Each class session should give you a fair idea how well you have understood the relevant material.
- Laboratory exercises: You will be asked to execute 10 mandatory laboratory exercises, write reports, solve specific computational problems, perform statistical testing and evaluation of observations and solutions and design specific auxiliary equipment of high precision surveys. Your participation is essential and will be assessed.
- Mid-term test.
- Final exam.

5. Announcements

Announcements and information related to the course, such as special lectures, class cancellations, change of due dates, professional activities, Internet links, and others will be emailed to the students. Please check regularly for up-to-date announcements and information.

ACADEMIC INTEGRITY

All students should take the time to acquaint themselves with the university's policy concerning academic integrity in courses. Cheating, plagiarsing amd making unauthorized multiple submissions of academic assignments are not allowed. You are all advised to read about this at http:/www.yorku.ca/academicintegrity ('For students' session), and to complete the Academic integrity tutorial at http:/www.yourku.ca/tutorial/academic integrity/. You should print the results page of your successful quiz and kepp it for verification if asked.

Ethical behaviour must be observed at all times.

SAFETY IN LAB AND FIELD

No Job is so important and no service so urgent that we cannot take time to perform our work safety. The following is not intended to be an all-inclusive capsule of safety requirements.

- Students comply with all safety regulations, policies of York University.
- Wear personal protective equipment in all designated areas or when otherwise directed to do so.
- Immediately report to TA or course Director if any safety incident occurs or may occur.
- Each individual in lab or in field has the responsibility and obligation to the other group members to work safely. If one sees another one perform an unsafe act, they should call this to the other person's attention, whether the unsafe act affects only the individual or the whole team.
- The equipment used has the potential to become very hazardous objects and must be properly secured for travel.
- The survey instruments used should be protected from any potential damage.

COURSE OUTLINE

1. Modern survey instruments – Testing and calibration
2. EDM principles and errors
3. Theodolites – principles, methodologies, errors.
4. High precision levelling – methodologies, errors.
5. Total station systems
6. Geodetic networks
7. Engineering surveys
8. Optimal design

TEXT BOOKS

1. Anderson, M.J., and E.M. Mikhail, (1998). Surveying: Theory and Practice. McGraw-Hill, (7^{th} Edition).
2. Wang, Jian-Guo (2007): Geodetic Surveys, Lecture Notes, Department of Earth and Space Science and Engineering, York University, revised 2007.
3. Vaníček P., and E. Krakiwsky (1986). Geodesy: The Concepts. North Holland, Amsterdam (2^{nd} Edition).

SUGGESTED REFERENCES

1. El-Rabbany, A. (2002). Introduction to GPS, the Global Positioning System. Artech House, Boston.
2. Kavanagh, B.F., (2003). Surveying Principles and Applications. Prentice Hall, New Jersey (6^{th} Edition).
3. Leick, A, (1995). GPS Satellite Surveying. John Wiley, New York (2^{nd} Edition).
4. Ghilani, C.D. and Wolf, P.R. (2006), Adjustment Computations: - Spatial Data Analysis, John Wiley & Sons (4th edition), 2006.
5. Mikhail, E.D., and G. Gracie, (1981), Analysis & Adjustment of Survey Measurements, Van Nostrand Reinhold.
6. Wolf, P.R., and C.D. Ghilani, (2002). Elementary Surveying. An Introduction to Geomatics. Prentice Hall, New Jersey (10^{th} Edition).
7. Research papers provided by the instructor.