FACULTY OF SCIENCE

SCHOOL OF BEES

GEOS2811

Remote Sensing Applications and Digital Image Analysis

S2, 2013

Faculty of Science - Course Outline - 2013

Contents:

Faculty of Science - Course Outline - 2013

1. Information about the course

NB: Some of this information is available on the UNSW Virtual Handbook[1]

Year of Delivery	2013
Course Codes	GEOS2811
Course Name	Remote Sensing Applications and Digital Image Analysis
Academic Unit	School of BEES
Level of Course	2nd year
Units of Credit	6UOC
Session(s) Offered	S2
Assumed Knowledge	None
Hours per Week	4
Number of Weeks	12
Dates	Weeks 2-12, session 2, 2013

Summary of Course Structure (for details see 'Course Schedule')

Component	Hours	Time	Day	Location
Lectures	24	11:00-13:00	Wed	Biomed F
Labs	24	14:00 – 16:00	Wed	Biosciences G11
Special Details				

2. Staff involved

Staff	Name	Contact Details	Consultation Times
Course Convener and Lecturer	Prof Bruce Forster	forster.bruce@gmail.com	By appointment outside scheduled contact times

[1] UNSW Virtual Handbook: http://www.handbook.unsw.edu.au/current/index.html

3. Course details

Course Description[2] (Handbook Entry)	Computer based techniques for digital image display, analysis and interpretation including the acquisition and processing of optical, hyper-spectral, thermal and radar remotely sensed imagery will be introduced. Laboratory work will use practical techniques including image enhancement, geometric correction, mapping. Classification and data interpretation will be developed with a focus on the use of earth-resource imagery for a wide range of environmental applications including geology, vegetation and forestry, agriculture, oceanographic and regional and urban analysis..
Course Aims	The main objective of this course is to provide you with an introduction to remote sensing data and digital image analysis. Through this approach, you will be better equipped to deal with the enormous variety of different applications you will encounter in the workforce.
Student Learning Outcomes	By the end of this course you will be expected to understand how and when you should use remotely sensed data to address geographic problems. You will also be expected to understand the advantages and limitations of such approaches.

[2] UNSW Virtual Handbook: http://www.handbook.unsw.edu.au/current/index.html

Graduate Attributes Developed in this Course

Science Graduate Attributes	FOCUS 0 = NO FOCUS 1 = MINIMAL 2 = MINOR 3 = MAJOR	Activities / Assessment
1. Research, inquiry and analytical thinking abilities	3	All will be achieved through the assessment tasks
2. Capability and motivation for intellectual development	3	
3. Ethical, social and professional understanding	1	
4. Communication	2	
5. Teamwork, collaborative and management skills	3	
6. Information literacy	3	

Major Topics (Syllabus Outline)	See the lecture sequence
Relationship to Other Courses within the Program	This course forms part of the BSc major in Spatial Information, as well as contributing and complementing other programs in the geosciences, biosciences and related disciplines.

4. Rationale and strategies underpinning the course

Rationale for learning and teaching in this course – How this course is taught	Remote sensing is technical in nature, in that one needs to use software to achieve one's aims. However, this course is not about teaching software. It is about the principles of remote sensing (software changes rapidly while principles do not). There are three elements that you should use for learning in the course. The textbooks provide an overview of the subject, and are a key reference source. In the case of the software, there are detailed online manuals that should be referred to. These include both command references and tutorials. Finally, there are your colleagues in the course. You are all working on similar problems, and you should be learning together. As described above, you are expected to do much of the learning both by yourself and with your colleagues.
Teaching Strategies	These will be advised by Prof Forster.
How the assessment supports and assists the learning	The assessment tasks are a learning exercise. One of the best ways to learn remote sensing is to actually do it, and this includes the process of making mistakes and repeating your work without these mistakes. This can be frustrating, but is a normal part of the learning process – you should expect to make many errors as part of your learning process, so don't panic.
Access to the lecturer	By appointment.

5. Course schedule

Note that this is a nominal sequence. Changes will be made as the needs of the course dictate.

Week	Lectures	Lab
Week 2	Introduction	Image viewing
Week 3	EMR	Image viewing
Week 4	EMR & Reflectance	Intro to ENVI
Week 5	Filtering	Contd
Week 6	Ratios & Transformations	Image Filtering
Week 7	Classification	Ratios and transformations
Week 8	Registration	(cont'd)
Week 9	Satellite Sensor Systems	Classification
Week 10	Intro to Radar RS	Image to map registration
Week 11	Intro. To Hyperspectral	Radar processing
Week 12	Review	Hyperspectral processing
Week 13	Review and Exam	Finish off practical exercises

6. Additional resources and support

Text Books

There is no set text for this course. However, a set of notes developed by Prof Forster will be made available through Blackboard, under the Resources page for this course.

Some general texts that might be useful are:

Jenson, J.R. (2004) Introductory Digital Image Processing (3rd Edition). Prentice Hall.

Lillesand, T., Kiefer, R.W. & Chipman, J. (2007) Remote sensing and Image Interpretation (6th edn). Wiley.

Course Manual

Lab instructions and lecture notes will be available through Blackboard.

Required Readings

These will be advised as the course progresses.

Additional Readings

Useful Journals:

International Journal of Remote Sensing
Remote Sensing of Environment
IEEE Transactions in Geoscience and Remote Sensing
Photogrammetric Engineering and Remote Sensing
Remote Sensing Reviews
Geocarto International
Journal of Applied Remote Sensing

You should also become familiar with the use of citation tracking in the Scopus and Web of Science databases. These are available via sirius.library.unsw.edu.au. Citation tracking allows you to see who has been citing articles, and who is cited in articles. It is a very good way of seeing if an idea or method has been critiqued or further developed by subsequent researchers.

Recommended Internet Sites

http://earth.eo.esa.int/satelliteimages/
http://visibleearth.nasa.gov/
http://earthobservatory.nasa.gov
http://neo.sci.gsfc.nasa.gov/Search.html

Computer Laboratories or Study Spaces

Biosciences G07, G11 and 640

7. Required Equipment, Training and Enabling Skills

Required equipment

Provided in the computer labs.

Enabling skills - training which may be required to complete this course

Working knowledge of Windows.

8. Assessment Tasks and Feedback

Task	% of total mark	Date of Release	Date of Submission	Feedback WHO	Feedback WHEN	Feedback HOW
Exam	60		End of session	BF		
Written reports	1. 25 2. 15		Friday, 1st of November, 2013	BF		

1. Written report: "Potential Application of Remote Sensing".
Describe a potential remote sensing application, of your choice, briefly explaining the sensors, wavelengths and processing you might use, and the possible benefits of this application. The written report will be of 3500 words in length.

2. A written report being a compilation of all the laboratory exercises you have completed with comments on the processes and procedures undertaken – approximately one to two pages per laboratory exercise.

Exam will be multiple choice and will be 1.5 hours duration held in the last lecture of the session.

9. Administrative Matters

Expectations of Students

You are expected to attend all lectures and laboratories. All assessable items are compulsory.

Assignment Submissions

Assignments are to be submitted via the BEES assignment box. Extensions will not be granted unless supported by documentation (eg doctor's certificate) or through UNSW Student Central (see https://my.unsw.edu.au/student/atoz/SpecialConsideration.html).

Occupational Health and Safety[3]

Information on relevant Occupational Health and Safety policies and expectations can be found at http://www.ohs.unsw.edu.au/ (UNSW) and http://www.bees.unsw.edu.au/ohs/indexohs.html (BEES).

Examination Procedures

The final exam will be held during the course.

Equity and Diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equity and Diversity Unit (9385 4734 or www.studentequity.unsw.edu.au).

Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

Grievance Policy[4]

School Contact	**Faculty Contact**	**University Contact**
Dr Jes Sammut Room 509, Phone: 9385 8281 j.sammut@unsw.edu.au	Dr Scott Mooney Associate Dean (Undergraduate Programs) s.mooney@unsw.edu.au Tel: 9385 6127	University Counselling Services Tel: 9385 5418

[3] UNSW Occupational Health and Safety: http://www.ohs.unsw.edu.au/

[4] UNSW Grievance Policy: https://my.unsw.edu.au/student/atoz/Complaints.html

10. UNSW Academic Honesty and Plagiarism

What is Plagiarism?

Plagiarism is the presentation of the thoughts or work of another as one's own.
*Examples include:

- direct duplication of the thoughts or work of another, including by copying material, ideas or concepts from a book, article, report or other written document (whether published or unpublished), composition, artwork, design, drawing, circuitry, computer program or software, web site, Internet, other electronic resource, or another person's assignment without appropriate acknowledgement;
- paraphrasing another person's work with very minor changes keeping the meaning, form and/or progression of ideas of the original;
- piecing together sections of the work of others into a new whole;
- presenting an assessment item as independent work when it has been produced in whole or part in collusion with other people, for example, another student or a tutor; and
- claiming credit for a proportion a work contributed to a group assessment item that is greater than that actually contributed.†

For the purposes of this policy, submitting an assessment item that has already been submitted for academic credit elsewhere may be considered plagiarism.

Knowingly permitting your work to be copied by another student may also be considered to be plagiarism.

Note that an assessment item produced in oral, not written, form, or involving live presentation, may similarly contain plagiarised material.

The inclusion of the thoughts or work of another with attribution appropriate to the academic discipline does *not* amount to plagiarism.

The Learning Centre website is main repository for resources for staff and students on plagiarism and academic honesty. These resources can be located via:

www.lc.unsw.edu.au/plagiarism

The Learning Centre also provides substantial educational written materials, workshops, and tutorials to aid students, for example, in:

- correct referencing practices;
- paraphrasing, summarising, essay writing, and time management;
- appropriate use of, and attribution for, a range of materials including text, images, formulae and concepts.

Individual assistance is available on request from The Learning Centre.

Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting, and the proper referencing of sources in preparing all assessment items.

* Based on that proposed to the University of Newcastle by the St James Ethics Centre. Used with kind permission from the University of Newcastle
† Adapted with kind permission from the University of Melbourne.

BEES Academic Honesty and Plagiarism

Please note:

In addition to the UNSW Policy on Academic Honesty and Plagiarism, the School of Biological, Earth and Environmental Sciences (BEES), also considers any work submitted that has been produced outside of a given course in a given year to be plagiarism i.e:

- Work produced for a third party e.g. your place of employment, is considered intellectual property of the third party, and as such if such work is submitted in place of a required course work, it is deemed plagiarism.

- All work submitted for assessment must be created specifically for the given assessment task in the given year. Work produced in previous years or for other assessments is not acceptable.