1.	**Course Code**	SWAE 4001	
2.	**Course Title**	Remote Sensing of the Environment	
3.	**Credits**	3 CR, 12 CP, 6 ECTS	
4.	**Pre-requisite Course (s)**	SWAE 3001	
5.	**Co-requisite Course (s)**	NA	
6.	**Equivalent Course (s)**	NA	
7.	**Course Category** (*Specify either as* Elective *or* Requirement *and appropriate level: College, Department, etc.*)	☐ University Requirement	☐ University Elective
		☐ College Requirement	☐ College Elective
		☐ Department Requirement	☒ Department Elective
		☐ Other (specify):	
8.	**Course Owner**	College: CAMS	Department:SWAE
9.	**Course Type**	Lecture/Lab	
10.	**Language of Instruction**	English	

11. Course Description

This course introduces the students to theoretical and practical foundations of remote sensing and its applications to environmental problems. A range of RS activities will be covered, e.g. sensors used, properties of the data, spectral reflectance and emittance of objects on the earth's surface, spectral signatures, image radiometric calibration, image geometric calibration, image processing of multi and hyper spectral images, supervised and unsupervised classification, and accuracy assessment techniques.

12. Teaching/Learning Strategies

Apart from normal lectures, short videos and practical sessions are also part of this course. Students will have to do case studies based on what they learn in lectures and in the practical sessions. There will be homework, 2 tests, 1 comprehensive final and lab/case study reports to assess student achievements.

13. Evaluation Methods

2 Tests	30%
Final	45%
Homework	5%
Lab reports and Project	20%
Total:	100%

14. Required Course Core Material

1) Remote Sensing and image Interpretation, Thomas Lillesand, Ralph W. Kiefer, and Jonathan Chipman, Wiley and Sons, 7th edition, 2015.
2) Hyperspectral Remote Sensing; Principles and Applications. William S., Hungate, Russell Watkins, and Marcus Borengasser. CRC, 2007.

15. Matching Course Objectives with the Program Outcomes and with SQU Graduate Attributes

* *Click here to view a list of action verbs use in developing objectives*

SQU Graduate Attributes

A. SQU graduates should be able to:	B. SQU graduates possess	C. SQU graduates should relish good citizenship qualities, conscious of their national identity and socially responsible, engage in community affairs and mindful of contemporary issues.
1. apply the knowledge and skills relevant to the specialization 2. communicate effectively and use information and communication technologies 3. critically analyze complex information and present it in simple legible manner	1. interpersonal communication skills and alignment with culture of international labour market to assist them in practical life and in living successfully 2. skills and motivation for independent learning and engagement in lifelong learning and research 3. work ethics and positive values, and enjoy intellectual independence and autonomy 4. teamwork skills and display potential leadership qualities	

#	Course Learning Objective	Relevant Program Outcome(s)	Applicable Attribute(s)
1.	Introduce the fundamental principles of remote sensing	Comprehend the fundamental principles of remote sensing	
2.	Introduce earth resource satellites and sensors	Comprehend the fundamental principles of remote sensing	
3.	Introduce the techniques of digital image analysis	Conduct analyses of digital satellite images in appropriate manner	
4.	Explore the various applications of remote sensing in environmental studies	Link remote sensing applications and concepts to practical environmental problems Carry out remote sensing project based on environmental research and studies	
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16. Student Responsibilities

It is the student's responsibility to know and comply with all University Academic Regulations relevant to participation in this course. These regulations specifically include the Attendance and Student Academic Misconduct policies.

For attendance, it is the student's responsibility to be punctual and to attend all classes.

Students are expected to perform their work with honesty and avoid any academic misconduct, which is defined as the use of any dishonest or deceitful means to gain some academic advantage or benefit. This can take many forms, including but not limited to, the following: copying, plagiarism, collusion and forging documents. For full details please refer to the Undergraduate Academic Regulations and to the Student Academic Misconduct Policy.

Additionally, this course requires that you:

COURSE INFORMATION

Course Code	SWAE 4001	Course Title		Remote Sensing of the Environment
Year/Semester	Fall 2017	Section		10/11
Day, Time, and Place				
Course Coordinator	Malik Al-Wardy			
Office Location	243	Office Hours		By Appointment
Office Ext.	1224	Email		mwardy@squ.edu.om

Tentative Schedule

Week	Lecture/Topic	Material to be Covered	Assignment /Exam	Weight (%)
1	Concepts and foundations of remote sensing	E-book 1/Section 1 Handouts	Lab 1	
2	Earth resource satellites, sensors, and data	E-book 1/Section 5 E-book 2/Section 3 Handouts	Lab 2	1
3	Interpretation of satellite images	E-book 1/Section 5 Handouts	Lab 3 HW 1	1 1
4	Image display, enhancement and interpretation	E-book 1/Section 7 Handouts	Lab 4	1
5	Digital image analysis	E-book 1/Section 7 Handouts	Lab 5 HW 2	1 1
6	Radiometric corrections	E-book 1/Section 7 E-book 2/Section 2 Handouts	Lab 6	1
7	Exam 1			15
8	Geometric transformations	E-book 1/Section 7 Handouts	Lab 7	1
9	Multi-spectral, thermal, and hyper-spectral sensing	E-book 1/Section 7 E-book 2/Section 4 Handouts	Lab 8 HW 3	1 1
10	Supervised and Unsupervised classification	E-book 1/Section 7 Handouts	Lab 9 HW 4	1 1
11	Accuracy assessment	E-book 1/Section 7 Handouts	Lab 10 HW 5	1 1
12	Applications of remote sensing	E-book 1/Section 8 E-book 2/Section 7/8/9/10 Handouts	Project	10
13	Exam 2			15
14	Monitoring environmental change with remote sensing	E-book 1/Section 7 E-Book 2/Section 7 Handouts	Project	
15	Integrating remote sensing and GIS	Handouts	Project	

Section	Instructor	Day, Time, and Location	Office Location and Extension	Email	Office Hours

APPENDIX A: INSTRUCTORS OF MULIPLE SECTIONS

APPENDIX B: ADDITIONAL INFOMARION

Additional E-books available:

1. Hyperspectral remote sensing of vegetation

2. Remote sensing of land use and land cover

3. Remote sensing of drought

4. Remote sensing of natural resources

5. Remote sensing for water resources, disasters, and urban studies

6. Classification methods of remotly sensed data