

H7APRG: Advanced Programming

Module Code:	H7APRG
Long Title	Advanced Programming APPROVED
Title	Advanced Programming
Module Level:	LEVEL 7
EQF Level:	6
EHEA Level:	First Cycle
Credits:	10
Module Coordinator:	
Module Author:	CRISTINA HAVA MUNTEAN
Departments:	School of Computing
Specifications of the qualifications and experience required of staff	This module requires a lecturer holding a BSc degree or higher, in computing/computer science or cognate discipline.
Learning Outcomes	
<i>On successful completion of this module the learner will be able to:</i>	
#	Learning Outcome Description
LO1	Explain the theory, concepts and principles of distributed systems operation and design
LO2	Compare and contrast the methods, theories, and concepts of Web Services.
LO3	Demonstrate conceptual, technical and practical skills in the analysis, design and test of distributed systems
LO4	Demonstrate conceptual, technical and practical skills in the implementation of advanced communication systems.
LO5	Demonstrate conceptual and technical skills in the analysis, design and implementation, management of systems and applications based on web services and REST web services.
LO6	Explain and apply advanced programming techniques, including exception handling and multithreaded programming
Dependencies	
Module Recommendations	
No recommendations listed	
Co-requisite Modules	
No Co-requisite modules listed	
Entry requirements	Learners should have attained the knowledge, skills and competence gained from stage 2 of the BSc (Hons) in Computing.

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Module Content & Assessment			
Indicative Content			
Multithreaded Programming • Concurrent execution of threads (multitasking) • User created threads • Thread priorities • Thread states and lifecycle			
Exception handling • General exception handling • Exception handling templates • Exception enrichment techniques			
Distributed Systems – Concepts and Principles • Description of a Distributed System • Distributed Systems Models • Parallel and Distributed Programming Paradigm • Evolution from centralised systems to web services and service oriented architectures. • Non-Functional Requirements • Security Options for Distributed System			
Service Oriented Architecture (SOA) and Web Distributed Services • The Web • Service orientated architecture • Web Services and their Approach to Distributed Computing • Web Services Technologies • Semantic Web • Semantic Web Services • Personalised Web • Distributed Recommender Systems • SOAP • WSDL • Web service security framework			
RESTful Web Services • Using the Uniform Interface • Identifying Resources • Designing Representations • Designing URIs • Web Linking • Content Negotiation • Queries • Web Caching • Security • Extensibility and Versioning			
API Development and Management • Service orientated architecture • API • Web API Invocations • Web API Responses • Design Patterns and consideration for Web services APIs • API management (exposure, security, access control, lifecycle management) • API's Testing and Evaluation			
Cloud-based Distributed Systems • Distributed and cloud-based storage architectures and file systems • Services in the Cloud Computing • Programming Distributed systems using Amazon Web Services and Windows Azure			
Ubiquitous Distributed Systems • Trends in supporting Ubiquitous Computing • Distributed Systems for Social and Professional Networking • Distributed Systems for Multimedia			
Assessment Breakdown			%
Coursework			50.00%
End of Module Assessment			50.00%
Assessments			
Full Time			
Coursework			
Assessment Type:	Project	% of total:	50
Assessment Date:	n/a	Outcome addressed:	3,4,5,6
Non-Marked:	No		
Assessment Description: The assessment will consist of practical tasks in the form of a group project, and it will assess learners' knowledge and competences on advanced programming techniques, web services and distributed systems. Feedback will be provided in oral format, or on-line through Moodle.			
End of Module Assessment			
Assessment Type:	Terminal Exam	% of total:	50
Assessment Date:	End-of-Semester	Outcome addressed:	1,2,3,4,5
Non-Marked:	No		
Assessment Description: Terminal assessment exam taken over 2 hours consists of one mandatory question and two questions of which the student must answer one that assess students' understanding of the underlying theories and concepts.			
No Workplace Assessment			
Reassessment Requirement			
Repeat examination <i>Reassessment of this module will consist of a repeat examination. It is possible that there will also be a requirement to be reassessed in a coursework element.</i>			
Reassessment Description The repeat strategy for this module is an examination. All learning outcomes will be assessed in the repeat exam.			

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Module Workload				
Module Target Workload Hours 0 Hours				
Workload: Full Time				
Workload Type	Workload Description	Hours	Frequency	Average Weekly Learner Workload
Lecture	No Description	24	Per Semester	2.00
Lab	No Description	48	Per Semester	4.00
Independent Learning	No Description	178	Per Semester	14.83
Total Weekly Contact Hours				6.00

Module Resources

Recommended Book Resources

Andrew Tanenbaum, Maarten van Steen. (2016), Distributed Systems: Principles and Paradigms, 2nd. CreateSpace Independent Publishing Platform.

Bogunuva Mohanram Balachandar. (2017), RESTful Java Web Services: A pragmatic guide to designing and building RESTful APIs using Java, 3rd. Packt Publishing.

Brenda Jin, Saurabh Sahni, Amir Shevat. (2018), Designing Web APIs: Building APIs That Developers Love, 1st. O'Reilly Media.

This module does not have any article/paper resources

This module does not have any other resources

Discussion Note: