RTU Course "Reinforced Concrete Structures (general course)"

31000 Faculty of Civil and Mechanical Engineering

General data

Code	BBK454
Course title	Reinforced Concrete Structures (general course)
Course status in the programme	Compulsory/Courses of Limited Choice
Responsible instructor	Leonīds Pakrastiņš
Volume of the course: parts and credits points	1 part, 4.5 credits
Language of instruction	LV, EN
Annotation	Properties of materials for reinforced concrete and masonry . Design codes and limit state calculation principles. Classification of reinforced concrete and masonry structures, typical cross sections, detailing and behaviour. Behaviour, design and detailing of prestressed reinforced concrete elements.
Goals and objectives of the course in terms of competences and skills	To be able to carry out the calculations of reinforced concrete and masonry elements of structures. To be able to use the terminology of the field in the state language.
Structure and tasks of independent studies	The developing of the calculation tasks that are handed out during the practical classes with the aim of the deeper understanding of the subject.
Recommended literature	Obligāta/Obligatory: 1. Mosley, W.H., Bungey, J.H. and Hulse, R. Reinforced Concrete Design to Eurocode 2 - 6th Edition. Palgrave Macmillan, 2007, 424 p. ISBN: 978-0-2305-0071-6. 2. Beeby A.W. and Narayanan R.S. Designers' guide to EN1992-1-1 and EN 1992-1-2. Eurocode 2: Design of Concrete Structures. Thomas Telford, 2005, 218 lpp. ISBN: 07277-3105-X. 3. Pakrastiņš L., Sprince A. Stiegrbetona konstrukciju aprēķina piemēri. Rīga: RTU, 2010. - 35 lpp. ISBN: 978-9934-8151-1-9. 4. Pakrastiņš L., Paegle I. Metodiskie norādījumi praktiskiem darbiem mācību priekšmetā „Dzelzsbetona un mūra konstrukcijas", Mūra konstrukciju projektēšana atbilstoši EC6. Rīga: RTU, 2009. - 18 lpp. Papildu/Additional: 5. Martin L. H. and Purkiss J. A. Concrete Design to EN 1992, Second Edition. Butterworth-Heinemann, 2006, 464 p. ISBN: 978-0-75-065059-5. 6. Eugene J.O'Brien and Andrew S.Dixon. Reinforced and Prestressed Concrete Design: The Complete Process. Longman Pub Group, 1995, 504 p. ISBN: 978-0582218833. 7. Zilch K., Zehetmaier G. Bemessung im konstruktiven Betonbau. Springer, 2005, 532 s. ISBN: 978-3540206507. 8. James G.MacGregor and James K.Wight. Reinforced Concrete - Mechanics and Design. Fourth Edition in SI Units. Prentice Hall, 2006, 1126 p. ISBN: 0-13-197642-7. 9. Brauns J. Stiegrota betona konstrukcijas. Eirokodekss EC2 konstrukciju projektešana. Jelgava: LLU, 2007. – 173 lpp. 10. Worked Examples to Eurocode 2: Volume 1. The Concrete Centre, 2009, 212 p. ISBN: 978-1-9046818-84-7. 11. Standard Method of Detailing Structural Concrete. A manual for best practice, Third edition. IStructE, 2006, 202 p. ISBN 978-0-901297-41-9. 12. Hendry A.W., Sinha B.P., Davies S.R. Design of Masonry Structures. Spon Press, 1997, 271 p. ISBN: 978-0-419-21560-8. 13. Manual for the design of plain masonry in building structures to Eurocode 6. IStructE, 2008, 136 p. ISBN 978-1-906335-02-1. 14. Eurocode for Masonry, EN 1996-1-1 and EN 1996-2: Guidance and worked examples. IMS, 2009, 130 p. ISBN: 1759-1287.
Course prerequisites	Structural analysis of buildings (introduction and general course)

Course contents

Content	Full- and part-time intramural studies		Part time extramural studies	
	Contact Hours	Indep. work	Contact Hours	Indep. work
System and structure of the Eurocodes. Safety concept. Principles of limit states design.	4	3	1	4
Properties of reinforced concrete (RC). Types of RC structures, durability aspects.	4	4	1	6
Structural analysis of RC structures.	2	3	1	6
Design of RC elements subjected to bending.	4	4	1	5
Design of RC elements subjected to bending with axial force.	4	5	1	8
Design of RC elements subjected to shear, punching shear and torsion.	4	5	1	8
Serviceability limit states of RC elements.	4	5	1	8
Detailing of RC elements and the specific rules.	4	5	1	6
Types and grouping of masonry, properties and durability.	4	5	1	6
Unreinforced masonry walls subjected to mainly vertical loading.	2	4	1	6
Unreinforced masonry walls subjected to shear and lateral loading.	2	3	1	6

Unreinforced masonry walls subjected to combined vertical and lateral loading.	2	3	1	6
Serviceability limit states of masonry.	2	3	1	6
Ties, detailing and simplified calculation methods.	2	3	1	6
Basic principles of behaviour, design and detailing of prestressed reinforced concrete elements.	4	5	1	6
Exam and consultations	12	0	12	0
Total:	60	60	27	93

Learning outcomes and assessment

Learning outcomes	Assessment methods
Ability to use the actual design codes in practice.	Evaluation of classwork, homeworks, study project and written examination.
Ability to select and apply structural models for buildings. Ability to calculate relevant actions on the structural elements.	Evaluation of classwork, homeworks, study project and written examination.
Ability to analyze the elements of reinforced concrete and masonry structures used in practice.	Evaluation of classwork, homeworks, study project and written examination.
Ability to calculate the capacities and the design of reinforced concrete and masonry joints and connections of structural elements.	Evaluation of classwork, homeworks, study project and written examination.
Ability to prepare the technical drawing of a designed structure.	Evaluation of classwork, homeworks, study project and written examination.

Evaluation criteria of study results

Criterion	%
Practical and laboratory works	50
Exam	50
Total:	100

Study subject structure

Part	CP	Hours			Tests		
		Lectures	Practical	Lab.	Test	Exam	Work
1.	4.5	1.0	1.0	1.0		*	