



## Course Specification

**Course Name:**[Robotics ]

**Course Code:**[IT415]

### I. Basic Course Information

Major or minor element of program:[Major]

Department offering the course:[Information Technology]

Academic level:[Level 400]

Semester in which course is offered:[Second (spring) Semester ]

Course pre-requisite(s): [Automatic Control IT314 ]

Credit Hours:3

Contact Hours Through:

Lecture	Tutorial*	Practical*	Total
2.5	0.0	1.5	4.0

\* 1.5 hours for **either** Tutorial or Practical

Approval date of course specification:[January 2015]

### II. Overall Aims of Course

[The robotics course aims at introducing the major concepts of the design of automated robotic systems. ]

### III. Program ILOs covered by course

Program Intended Learning Outcomes (By Code)			
Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
[K1,K2,K17,K20 ]	[I2,I6,I19 ]	[P13,P14,P16,P20 ]	[G2,G4,G5 ]



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#### IV. Intended Learning Outcomes of Course (ILOs)

##### a. Knowledge and Understanding

On completing the course, students should be able to:

- K.1 Explain the underlying principles behind robotic systems.
- K.2 Differentiate between different robotics design techniques.
- K.3 Differentiate between sensors and effectors.
- K.4 Illustrate type of robotic control mechanisms.
- K.5 Show motion of robot arms and motors.]

##### b. Intellectual/Cognitive Skills

On completing the course, students should be able to:

- I.1 Design and implement a simple robot.
- I.2 Move a robot arm using one or more control mechanism.
- I.3 Integrate sensors and effectors into a robotic system. ]

##### c. Practical/Professional Skills

On completing the course, students should be able to:

- P.1 Make choice between different robotic control mechanisms.
- P.2 Decide the best co-ordinate system used in a specific application.
- P.3 Decide whether to use analog or digital effectors and sensors in a specific robotic application.
- P.4 Design and make presentation of specific robotic application. ]

##### d. General and Transferable Skills

On completing the course, students should be able to:

- G.1 Improve presentation skills.
- G.2 Improve team work skills.
- G.3 Appreciate physics applications in life. ]

#### V. Course Matrix Contents

	Main Topics / Chapters	Duration (Weeks)	Course ILOs Covered by Topic (By ILO Code)			
			K & U	I.S.	P.S.	G.S.
1-	Introduction to robotics ]	[ 1 ]	[K1 ]	[ ]	[ ]	[ ]
2-	Co-ordinate Systems & Robot arms ]	[ 2 ]	[K1 ]	[I1 ]	[P1,P2 ]	[ ]
3-	End effectors & sensors ]	[ 2 ]	[K2,K3 ]	[I1,I3 ]	[P3 ]	[ ]
4-	Applications of sensors ]	[ 1 ]	[K3 ]	[ ]	[ ]	[ ]
5-	Hydraulic System units ]	[ 1 ]	[K4 ]	[ ]	[P1 ]	[ ]
6-	Electrical System units ]	[ 1 ]	[K4 ]	[ ]	[P1 ]	[ ]
7-	Robotic control ]	[ 1 ]	[K4 ]	[I2 ]	[P1,P4 ]	[ ]
8-	Advanced Sensing ]	[ 1 ]	[K3 ]	[ ]	[ ]	[ ]
9-	Programming of Robots ]	[ 1 ]	[K4,K5 ]	[I1,I2 ]	[P1,P4 ]	[G2,G3 ]
10-	Safety Considerations ]	[ 1 ]	[K2,K5 ]	[I3 ]	[P2 ]	[G3 ]
	<b>Net Teaching Weeks</b>	<b>13</b>				



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VI. Course Weekly Detailed Topics / hours / ILOs

Week No.	Sub-Topics	Total Hours	Contact Hours	
			Theoretical Hours	Practical Hours*
1	Introduction to Robotics	2.5	2.5	
2	Co-ordinate Systems	4	2.5	1.5
3	Robot Arms	4	2.5	1.5
4	End Effectors	4	2.5	1.5
5	Sensors	4	2.5	1.5
6	Applications of sensors	4	2.5	1.5
7	<b>Midterm Exam</b>			
8	Hydraulic System units	4	2.5	1.5
9	Electrical System units	4	2.5	1.5
10	Robotic control	4	2.5	1.5
11	Advanced Sensing	4	2.5	1.5
12	Programming of Robots	4	2.5	1.5
13	Safety Considerations	4	2.5	1.5
14	Safety Considerations	4	2.5	1.5
15	<b>Final Exam</b>			
<b>Total Teaching Hours</b>		<b>51</b>	<b>33</b>	<b>18</b>

\* No Practical/Tutorial during the first week of the semester

VII. Teaching and Learning Methods

Teaching/Learning Method	Selected Method	Course ILOs Covered by Method (By ILO Code)			
		K & U	Intellectual Skills	Professional Skills	General Skills
Lectures & Seminars	<input checked="" type="checkbox"/>	[K1:K5]	[I2]	[P1:P3]	[ ]
Tutorials	<input type="checkbox"/>	[ ]	[ ]	[ ]	[ ]
Computer lab Sessions	<input type="checkbox"/>	[ ]	[ ]	[ ]	[ ]
Practical lab Work	<input checked="" type="checkbox"/>	[ ]	[I1]	[P1:P4]	[G2,G3]
Reading Materials	<input checked="" type="checkbox"/>	[K1:K5]	[I1:I3]	[ ]	[ ]
Web-site Searches	<input checked="" type="checkbox"/>	[K1:K5]	[I1:I3]	[P1:P4]	[G2]
Research & Reporting	<input type="checkbox"/>	[ ]	[ ]	[ ]	[ ]
Problem Solving / Problem-based Learning	<input type="checkbox"/>	[ ]	[ ]	[ ]	[ ]
Projects	<input type="checkbox"/>	[ ]	[ ]	[ ]	[ ]
Independent Work	<input type="checkbox"/>	[ ]	[ ]	[ ]	[ ]
Group Work	<input checked="" type="checkbox"/>	[ ]	[I1]	[P1:P4]	[G1,G2]
Case Studies	<input type="checkbox"/>	[ ]	[ ]	[ ]	[ ]
Presentations	<input checked="" type="checkbox"/>	[ ]	[I1]	[P4]	[G1,G2,G3]
Simulation Analysis	<input type="checkbox"/>	[ ]	[ ]	[ ]	[ ]
Others (Specify):	<input type="checkbox"/>	[ ]	[ ]	[ ]	[ ]



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VIII. Assessment Methods, Schedule and Grade Distribution

Assessment Method	Selected Method	Course ILOs Covered by Method (By ILO Code)				Assessment Weight / Percentage	Week No.
		K & U	I.S.	P.S.	G.S.		
Midterm Exam	x	K1:K3	I2,I3			15%	7
Final Exam	x	K1:K5	I2,I3			60%	15
Quizzes	x	K1:K4	I2,I3			10%	9
Course Work							
Report Writing							
Case Study Analysis							
Oral Presentations							
Practical	x			P1:P4		10%	10
Group Project	x	K2:K5	I1:I3	P1,P4	G1:G3	5%	12
Individual Project							
Others (Specify):							

IX. List of References

<b>Essential Text Books</b>	<ul style="list-style-type: none"> <li>Introduction to Robotics, Mechanics and Control, Third Edition by John J. Craig, 2005</li> </ul>
<b>Course notes</b>	<ul style="list-style-type: none"> <li>Lecture Slides and Notes</li> </ul>
<b>Recommended books</b>	<ul style="list-style-type: none"> <li>Robotic Explorations: A Hands-on Introduction to Engineering, by Fred G. Martin, 2000</li> </ul>
<b>Periodicals, Web sites, etc ...</b>	<ul style="list-style-type: none"> <li>Various</li> </ul>

X. Facilities required for teaching and learning

<ul style="list-style-type: none"> <li>Electronic sensors</li> <li>Hydraulic system units</li> <li>Electrical system motors</li> </ul>
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**Date:** January 2015