



Biomedical Engineering Program Specification

Course Specification of Engineering Project Management

I. Course Identification and General Information:						
1	Course Title:	Engineering Project Management.				
2	Course Code & Number:	FR304				
3	Credit hours:	C.H				TOTAL CR.HRS
		Th.	Seminar	Pr.	Tu.	
		2	-	-	2	3
4	Study level/ semester at which this course is offered:	Fifth Year- First Semester.				
5	Pre –requisite (if any):	-				
6	Co –requisite (if any):	-				
7	Program (s) in which the course is offered:	Biomedical Engineering Program.				
8	Language of teaching the course:	English Language.				
9	Location of teaching the course:	Biomedical Engineering Department.				
10	Prepared By:	Dr. Tarek A. Barakat.				
11	Date of Approval:					

II. Course Description:

This course is designed to introduce and reinforce the principles, tools and techniques of project management, including project planning, scheduling and controlling, estimating, budgeting, staffing, task and cost control; marketing and feasibility studies, communication; and resource management. Students will be provided an overview of project management covering fundamental elements of the project management process.

Head of Department
 Dr. Mohammed A. Al-Olofi

Quality Assurance Unit
 Ass. Prof. Dr. Mohammad Algorafi

Dean of the Faculty
 Prof. Dr. Mohammed AL-Bukhaiti

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III. Course Intended learning outcomes (CILOs) of the course		Referenced PILOs
a.1	Describe knowledge of the engineering process, stages and parties and the various types of contracts in projects.	A2
a.2	Classify knowledge of tools and techniques of project management.	A2, A4
a.3	Establish hands on knowledge of the use of scheduling software albeit Microsoft Project Manager in project management planning.	A3
b.1	Explore the quality, safety, health and environmental management systems considering the project and relevant international practices and standards.	B1, B3
b.2	Create relevant software for use in project management.	B2
b.3	Merge the economic, social, and environmental issues as well as management.	B4
c.1	Apply project management systems for projects.	C2
c.2	Employ techniques learned to planning and project management and develop the ability to use software in projects.	C3
c.3	Perform estimates, budgets, feasibility studies and project briefs for engineering projects.	C4
d.1	Co-operate effectively using written, oral and graphical skills.	D1
d.2	Evaluate schedules and resources.	D2
d.3	Assess to work independently and in a team.	D3

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1- Describe knowledge of the engineering process, stages and parties and the	<ul style="list-style-type: none"> Lecture. Presentations. 	<ul style="list-style-type: none"> Written exam. Short Essays.

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various types of contracts in projects.		
a2- Classify knowledge of tools and techniques of project management.	<ul style="list-style-type: none"> • Lecture. • Presentations. 	<ul style="list-style-type: none"> • Written exam. • Short Essays.
a3- Establish hands on knowledge of the use of scheduling software albeit Microsoft Project Manager in project management planning.	<ul style="list-style-type: none"> • Lecture. • Presentations. 	<ul style="list-style-type: none"> • Written exam. • Short Essays.

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1- Explore the quality, safety, health and environmental management systems considering the project and relevant international practices and standards.	<ul style="list-style-type: none"> • Lecture. • Presentations. • Case study. 	<ul style="list-style-type: none"> • Participation. • Written exam. • Short Essays.
b2- Create relevant software for use in project management.	<ul style="list-style-type: none"> • Lecture • Presentations. 	<ul style="list-style-type: none"> • Participation. • Written exam. • Short Essays. • Project.
b3- Merge the economic, social, and environmental issues as well as management.	<ul style="list-style-type: none"> • Lecture. • Presentations. • Discussion. 	<ul style="list-style-type: none"> • Participation. • Written exam. • Short Essays.

© Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1- Apply project management systems for projects.	<ul style="list-style-type: none"> • Lecture. • Presentations. 	<ul style="list-style-type: none"> • Participation. • Written exam. • Short Essays. • Project.
c2- Employ techniques learned to planning	<ul style="list-style-type: none"> • Lecture. 	<ul style="list-style-type: none"> • Participation.

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and project management and develop the ability to use software in projects.	<ul style="list-style-type: none"> • Presentations. 	<ul style="list-style-type: none"> • Written exam. • Short Essays. • Project.
c3- Perform estimates, budgets, feasibility studies and project briefs for engineering projects.	<ul style="list-style-type: none"> • Lecture. • Presentations. 	<ul style="list-style-type: none"> • Participation. • Written exam. • Short Essays. • Project.

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1- Co-operate effectively using written, oral and graphical skills.	<ul style="list-style-type: none"> • Lecture. • Presentations. • Case study. • Group project. 	<ul style="list-style-type: none"> • Participation. • Written exam. • Short Essays. • Group presentations.
d2 Evaluate schedules and resources.	<ul style="list-style-type: none"> • Lecture. • Presentations. • Case study. • Group project. 	<ul style="list-style-type: none"> • Participation. • Written exam. • Short Essays. • Group presentations.
d3- Assess to work independently and in a team.	<ul style="list-style-type: none"> • Lecture. • Presentations. • Case study. • Group project. 	<ul style="list-style-type: none"> • Participation. • Written exam. • Written assignment. • Group presentations.

IV. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	Contact hours
1	Project cycle Characteristics of engineering projects.	a1	The engineering project cycle and process and main stages. The unique characteristics of engineering projects and their	1	2

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			effect in projects.		
2	WBS (work breakdown structure) OBS (organization breakdown structure). Project activities Levels of planning.	a2, b2, c2, d2	Introduction to project planning including WBS (work breakdown structure) and OBS (organization breakdown structure). Defining project activities and tasks and the various types. The levels of planning are described and when to be used. Understand how to number activities.	2	4
3	Types and techniques of project scheduling Relationships between activities and constraints.	a2, c2, d2	Introduction to types and techniques of project scheduling for planning (mainly AON and AOA). Understand the relationships between activities and constraints affecting scheduling and rules. Provide an example of WBS, OBS and relationships.	1	2
4	Drawing the network schedule diagram CPM calculations. Application of scheduling software.	a2, a3, b2, c2, d2	Drawing the network schedule diagram using AOA and AON and performing CPM calculations with forward and backward passes. Understanding float and the critical path(s) of projects. Application of scheduling software.	2	4
5	Scheduling under uncertainty. Productivity for planning. The cost model.	a2, a3, b3, c2, c3, d2	The need for, benefits and elements of planning. Scheduling under uncertainty using probability. Calculating productivity for planning. Resource loading project schedules. The effect of early completion on direct and	1	2

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			indirect costs and overall project cost. Application of scheduling software.		
6.	Mid-Term Exam.		The first 5 chapters.	1	2
7	Project control. Application of scheduling software.	a2, a3, b2, b3, c2, d2	Project control and the mechanism and dynamics involved. Application of scheduling software.	1	2
8	Project estimating and budgeting. Resource loading.	a2, a3,b2, b3, c2, c3, d2	Project planning and control using scheduling software.	2	4
9	Quality management and control. HSE management and control.	a2, b1, b3, c2	Quality management in construction projects and its importance. Control of quality in construction projects. HSE management in construction projects and its importance as well as control mechanisms.	1	2
10	Principles of marketing. Principles of feasibility studies.	a2, b3, c3, d2	Introduction to marketing relating to projects. Introduction on how to make feasibility studies for projects.	2	4
11	The engineering profession. Communication.	d1, b3	The building professions and their roles, social obligations and professional responsibilities and the ethical standards required of individuals and the project management team. Communication in the construction industry and its importance.	1	2
12	Final Exam		All the chapters.	1	2
Number of Weeks /and Units Per Semester				16	32

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Sana'a University

Faculty of Engineering

Department of Biomedical Engineering



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Head of Department
Dr. Mohammed A. Al-
Olofi

Quality Assurance Unit
Ass. Prof. Dr. Mohammad
Algorafi

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B – Tutorial Aspect:				
Order	Tasks/ Experiments	Number of Weeks	Contact hours	Learning Outcomes
1	Project cycle Characteristics of engineering projects.	1	2	a1
2	WBS (work breakdown structure) OBS (organization breakdown structure). Project activities Levels of planning.	2	4	a2, b2, c2, d2
3	Types and techniques of project scheduling Relationships between activities and constraints.	1	2	a2, c2, d2
4	Drawing the network schedule diagram CPM calculations. Application of scheduling software.	2	4	a2, a3, b2, c2, d2
5	Scheduling under uncertainty. Productivity for planning. The cost model.	1	2	a2, a3, b3, c2, c3, d2
6	Project control. Application of scheduling software.	1	2	a2, a3, b2, b3, c2, d2
7	Project estimating and budgeting. Resource loading.	2	4	a2, a3, b2, b3, c2, c3, d2
8	Quality management and control. HSE management and control.	1	2	a2, b1, b3, c2
9	Principles of marketing. Principles of feasibility studies.	2	4	a2, b3, c3, d2
10	The engineering profession. Communication.	1	2	d1, b3
Number of Weeks /and Units Per Semester		14	28	

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V. Teaching strategies of the course:

Lecture.
Presentations.
Participation.
Case Study.
Group Project.

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1.	WBS and OBS	a2 - b2- c2 – d2	5	1
2.	Creating a project schedule using CPM	a2 –a3–b2- c2 – d2	7	2
3.	Calculating productivity Budgeting Resource loading	a2 –a3–b2- b3 - c2 – c3 – d2	10	2
4.	QA/QC & HSE	a2 – b1 – b3- c2	12	2
5.	Marketing and feasibility studies	a2 – b3- c3 – d2	13	2
6.	Communication	d1- b3	14	1
Total				10

VII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1.	Written assignment	5- 7- 10 -12 - 14-15	15	10 %	a2 –a3–b2- b3 - c2 – c3 – d1 - d2
2.	Quizzes.	Two times	7.5	5%	b1-b2- b3 - c2 – c3

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Olofi

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Algorafi

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3.	Group project	14	7.5	5%	c2 – c3 – d1 - d2 – d3
4.	Mid-Term Exam.	8 th	15	10%	b1-b2- b3 - c2 – c3
5.	Final-exam.	16	105	70%	b1-b2- b3 - c2 – c3
Total			150	100%	

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VIII. Learning Resources:

I. Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).

1- Required Textbook(s) (maximum two).

1. O'Brien and Plotnick – 2006 – CPM in Construction Management – 6th Edition, Mc Hill
2. Pulmia and Khandelwal- 2002 – Project Planning and Control with CPM and PERT, 4th ed., Laxmi Publications Ltd.
3. Fellows et al. –2002 - Construction Management in Practice, 2nd Edition, Blackwell Science

2- Essential References.

- 1 -Project Management Body of Knowledge (PMBOK) 5th edition

3- Electronic Materials and Web Sites etc.

- 1 -Microsoft Project Manager

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IX. Course Policies:	
1	Class Attendance: The students should have more than 75 % of attendance according to rules and regulations of the faculty.
2	Tardy: The students should respect the timing of attending the lectures. They should attend within 1 minute from starting of the lecture.
3	Exam Attendance/Punctuality: The student should attend the exam on time. The punctuality should be implemented according to rules and regulations of the faculty for midterm exam and final exam.
4	Assignments & Projects: The assignment is given to the students after each chapter, the student has to submit all the assignments for checking on time.
5	Cheating: If any cheating occurred during the examination, the student is not allowed to continue and he/she has to face the examination committee for enquires.
6	Plagiarism: The student will be terminated from the Faculty, if one student attends the exam on another behalf according to the policy, rules and regulations of the university.
7	Other policies: _ All the teaching materials should be kept out the examination hall. _ The mobile phone is not allowed. _ There should be a respect between the student and his teacher.

Reviewed	Vice Dean for Academic Affairs and Post Graduate Studies: Dr. Tarek A. Barakat
By	President of Quality Assurance Unit: Ass. Prof. Dr. Mohammed Algorafi
	Head of Mechatronics Engineering Department: Ass. Prof. Dr. Abdul-Malik Momin

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Dr. Mohammed A. Al-Olofi

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	Deputy Rector for Academic Affairs Dr. Ibrahim AlMutaa Ass. Prof. Dr. Ahmed Mujahed Dr. Munaser Alsubri
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Course Plan of Engineering Project Management

I. - Information about Faculty Member Responsible for the Course:						
Name of Faculty Member	Dr. Tarek A. Barakat		Office Hours			
Location & Telephone No.		SAT	SUN	MON	TUE	WE D
E-mail				8-10		TH U

II. Course Identification and General Information:						
1.	Course Title:	Engineering Project Management				
2.	Course Number & Code:	FR304				
3.	Credit hours:	C.H				Total Cr. Hrs.
		Th.	Seminar	Pr.	Tu.	
		2	-	-	2	3
4.	Study level/year at which this course is offered:	Fifth Year - First Semester.				
5.	Pre-requisite (if any):	-				
6.	Co-requisite (if any):	-				
7.	Program (s) in which the course is offered	Biomedical Engineering Program.				
8.	Language of teaching the course:	English Language.				
9.	System of Study:	Semesters.				
10.	Mode of delivery:	Lectures and Tutorials.				
11.	Location of teaching the course:	Biomedical Engineering Department.				

III. Course Description:
This course is designed to introduce and reinforce the principles, tools and techniques of project management, including project planning, scheduling and controlling, estimating, budgeting, staffing,

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Dr. Mohammed A. Al-Olofi

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task and cost control; marketing and feasibility studies, communication; and resource management. Students will be provided an overview of project management covering fundamental elements of the project management process.

IV. Course Intended learning outcomes (CILOs) of the course		Referenced PILOs
a.1	Describe knowledge of the engineering process, stages and parties and the various types of contracts in projects.	A2
a.2	Classify knowledge of tools and techniques of project management.	A2, A4
a.3	Establish hands on knowledge of the use of scheduling software albeit Microsoft Project Manager in project management planning.	A3
b.1	Explore the quality, safety, health and environmental management systems considering the project and relevant international practices and standards.	B1, B3
b.2	Create relevant software for use in project management.	B2
b.3	Merge the economic, social, and environmental issues as well as management.	B4
c.1	Apply project management systems for projects.	C2
c.2	Employ techniques learned to planning and project management and develop the ability to use software in projects.	C3
c.3	Perform estimates, budgets, feasibility studies and project briefs for engineering projects.	C4
d.1	Co-operate effectively using written, oral and graphical skills.	D1
d.2	Evaluate schedules and resources.	D2
d.3	Assess to work independently and in a team.	D3

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V. Course Content:				
<ul style="list-style-type: none"> Distribution of Semester Weekly Plan Of course Topics/Items and Activities. 				
A – Theoretical Aspect:				
Order	Units/Topics List	Sub Topics List	Number of Weeks	Contact hours
1	Project cycle Characteristics of engineering projects.	The engineering project cycle and process and main stages. The unique characteristics of engineering projects and their effect in projects.	1	2
2	WBS (work breakdown structure) OBS (organization breakdown structure). Project activities Levels of planning.	Introduction to project planning including WBS (work breakdown structure) and OBS (organization breakdown structure). Defining project activities and tasks and the various types. The levels of planning are described and when to be used. Understand how to number activities.	2,3	4
3	Types and techniques of project scheduling Relationships between activities and constraints.	Introduction to types and techniques of project scheduling for planning (mainly AON and AOA). Understand the relationships between activities and constraints affecting scheduling and rules. Provide an example of WBS, OBS and relationships.	4	2
4	Drawing the network schedule diagram CPM calculations. Application of scheduling software.	Drawing the network schedule diagram using AOA and AON and performing CPM calculations with forward and backward passes. Understanding float and the critical path(s) of projects. Application of scheduling software.	5,6	4
5	Scheduling under uncertainty.	The need for, benefits and elements of planning.	7	2

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	Productivity for planning. The cost model.	Scheduling under uncertainty using probability. Calculating productivity for planning. Resource loading project schedules. The effect of early completion on direct and indirect costs and overall project cost. Application of scheduling software.		
6.	Mid-Term Exam.	The first 5 chapters.	8	2
7	Project control. Application of scheduling software.	Project control and the mechanism and dynamics involved. Application of scheduling software.	9	2
8	Project estimating and budgeting. Resource loading.	Project planning and control using scheduling software.	10,11	4
9	Quality management and control. HSE management and control.	Quality management in construction projects and its importance. Control of quality in construction projects. HSE management in construction projects and its importance as well as control mechanisms.	12	2
10	Principles of marketing. Principles of feasibility studies.	Introduction to marketing relating to projects. Introduction on how to make feasibility studies for projects.	13,14	4
11	The engineering profession. Communication.	The building professions and their roles, social obligations and professional responsibilities and the ethical standards required of individuals and the project management team. Communication in the construction industry and its importance.	15	2
12	Final Exam	All the chapters.	16	2
Number of Weeks /and Units Per Semester			16	32

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B – Tutorial Aspect:				
Order	Tasks/ Experiments	Number of Weeks	Contact hours	Learning Outcomes
1	Project cycle Characteristics of engineering projects.	1	2	a1
2	WBS (work breakdown structure) OBS (organization breakdown structure). Project activities Levels of planning.	2,3	4	a2, b2, c2, d2
3	Types and techniques of project scheduling Relationships between activities and constraints.	4	2	a2, c2, d2
4	Drawing the network schedule diagram CPM calculations. Application of scheduling software.	5,6	4	a2, a3, b2, c2, d2
5	Scheduling under uncertainty. Productivity for planning. The cost model.	7	2	a2, a3, b3, c2, c3, d2
6	Project control. Application of scheduling software.	8	2	a2, a3, b2, b3, c2, d2
7	Project estimating and budgeting. Resource loading.	9,10	4	a2, a3, b2, b3, c2, c3, d2
8	Quality management and control. HSE management and control.	11	2	a2, b1, b3, c2
9	Principles of marketing. Principles of feasibility studies.	12,13	4	a2, b3, c3, d2
10	The engineering profession. Communication.	14	2	d1, b3
Number of Weeks /and Units Per Semester		14	28	

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VI. Teaching strategies of the course:

Lecture.
 Presentations.
 Participation.
 Case Study.
 Group Project.

VII. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1.	WBS and OBS	a2 - b2- c2 – d2	5	1
2.	Creating a project schedule using CPM	a2 –a3–b2- c2 – d2	7	2
3.	Calculating productivity Budgeting Resource loading	a2 –a3–b2- b3 - c2 – c3 – d2	10	2
4.	QA/QC & HSE	a2 – b1 – b3- c2	12	2
5.	Marketing and feasibility studies	a2 – b3- c3 – d2	13	2
6.	Communication	d1- b3	14	1
Total				10

VIII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1.	Written assignment	5- 7- 10 -12 - 14-15	15	10 %	a2 –a3–b2- b3 - c2 – c3 – d1 - d2
2.	Quizzes.	Two times	7.5	5%	b1-b2- b3 - c2 –

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					c3
3.	Group project	14	7.5	5%	c2 – c3 – d1 - d2 – d3
4.	Mid-Term Exam.	8 th	15	10%	b1-b2- b3 - c2 – c3
5.	Final-exam.	16	105	70%	b1-b2- b3 - c2 – c3
Total			150	100%	

IX. Learning Resources:

Written in the following order: (Author – Year of publication – Title – Edition – Place of publication – Publisher).

1- Required Textbook(s) (maximum two).

1. O'Brien and Plotnick – 2006 – CPM in Construction Management – 6th Edition, McGraw Hill
2. Pulmia and Khandelwal- 2002 – Project Planning and Control with CPM and PERT, 4th ed., Laxmi Publications Ltd.
3. Fellows et al. –2002 - Construction Management in Practice, 2nd Edition, Blackwell Science

2- Essential References.

- 1 -Project Management Body of Knowledge (PMBOK) 5th edition

3- Electronic Materials and Web Sites etc.

- 1 -Microsoft Project Manager

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 Prof. Dr. Mohammed AL-Bukhaiti

Academic Development
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 Ass. Prof. Dr. Huda Al-Emad

Rector of Sana'a University
 Prof. Dr. Al-Qassim Mohammed Abbas



Biomedical Engineering Program Specification

X. Course Policies:	
Unless otherwise stated, the normal course administration policies and rules of the Faculty of ----- apply. For the policy, see: -----	
1	Class Attendance: The students should have more than 75 % of attendance according to rules and regulations of the faculty.
2	Tardy: The students should respect the timing of attending the lectures. They should attend within 1 minutes from starting of the lecture.
3	Exam Attendance/Punctuality: The student should attend the exam on time. The punctuality should be implemented according to rules and regulations of the faculty for midterm exam and final exam.
4	Assignments & Projects: The assignment is given to the students after each chapter, the student has to submit all the assignments for checking on time.
5	Cheating: If any cheating occurred during the examination, the student is not allowed to continue and he/she has to face the examination committee for enquires.
6	Plagiarism: The student will be terminated from the Faculty, if one student attends the exam on another behalf according to the policy, rules and regulations of the university.
7	Other policies: -All the teaching materials should be kept out the examination hall. -The mobile phone is not allowed. -There should be a respect between the student and his teacher.

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