





Course Specifications

| Course Title: | Physical Chemistry1 |
|----------------------|--|
| Course Code: | 42021311 |
| Program: | Bachelor of Science inChemistry |
| Department: | Department of Chemistry |
| College: | Faculty of Science |
| Institution: | Albaha University |





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A. Course Identification

| 1. Credit hours: 4 credit hrs. (3 lecture + 1 Practical) | | | |
|--|--|--|--|
| 2. Course type | | | |
| a. University College Department $$ Others | | | |
| b. Required $$ Elective | | | |
| 3. Level/year at which this course is offered: | | | |
| 4. Pre-requisites for this course (if any):GeneralChemistryII(42021213) | | | |
| | | | |
| | | | |
| 5. Co-requisites for this course (if any): | | | |
| None | | | |
| | | | |
| None | | | |

6. Mode of Instruction (mark all that apply)

| No | Mode of Instruction | Contact Hours | Percentage |
|----|-----------------------|----------------------|------------|
| 1 | Traditional classroom | 75 | 100% |
| 2 | Blended | | |
| 3 | E-learning | | |
| 4 | Correspondence | | |
| 5 | Other | | |

7. Actual Learning Hours (based on academic semester)

| No | Activity | Learning Hours | | |
|---------|---------------------------------|----------------|--|--|
| Contac | t Hours | | | |
| 1 | Lecture | 45 | | |
| 2 | Laboratory/Studio | 30 | | |
| 3 | Tutorial | 3 | | |
| 4 | Others (specify) | 3 | | |
| | Total | 81 | | |
| Other] | Other Learning Hours* | | | |
| 1 | Study | 45 | | |
| 2 | Assignments | 15 | | |
| 3 | Library | 15 | | |
| 4 | Projects/Research Essays/Theses | | | |
| 5 | Others(specify) | | | |
| | Total | 75 | | |

*The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times



B. Course Objectives and Learning Outcomes

1. Course Description

This course provide the students with an understanding to the three laws of thermodynamics; relationships involving heat flow, work, and energy changes. Grasp of concepts of entropy, enthalpy, free energy; use insolving problems involving changes in state. Apply equations of state to calculatechanges in gas (ideal and nonideal) gases. Understand phase and chemical equilibrium; apply knowledge to interpreting phase diagrams and assessing system compositionunder various conditions. Knowledge of kinetic theory of gases and applications tophysical properties of gases.

2. Course MainObjective

The main objectives of this course are to:

- 1- Provide the students with an understanding to the concepts of thermodynamics and laws of thermodynamics.
- 2- Introduce the students to the gas laws and calculations related to these laws and kinetic theory..
- 3- Understand the phase rules and equilibrium.

3. Course Learning Outcomes

| | CLOs | AlignedPLO s | |
|-----|---|-----------------|--|
| 1 | Knowledge: | | |
| 1.1 | Recognize different types of gases, their properites and realted equations of states. | 1.1 | |
| 1.2 | Explain the laws of thermodynamics and their applications to physical and chemical changes and properties, entropy calcualtion, Gibbs energy and chemical potential | 1.2 | |
| 1.3 | Describe the features of phase diagrams for unary and binary systems. | 1.3 | |
| 1 | | | |
| 2 | Skills : | | |
| 2.1 | Use thermodynamics equations and laws to calculate different parameters for specific processes. | 2.1 | |
| 2.2 | Explain the interconversion of different types of energy in any given 2.2 system. | | |
| 2.3 | Conduct chemical experiments using scientific devices in a safe and 2.3 right manner. | | |
| | | | |
| 3 | Competence: | | |
| 3.1 | Bear self-learning responsibility and decision-making. | 3.2 | |
| 3.2 | Write reports and use various techniques to collect information. 3.3 | | |
| 3 | | | |

C. Course Content

| No | List of Topics | | | Contact Hours | | | | | |
|----|----------------|--------|-------|--------------------|-------|-------|---------|-----------|---|
| 1 | Introd | uction | to ph | ysical chemistry 1 | | | | | 3 |
| 2 | First | law | of | thermodynamics; | heat, | work, | energy, | enthalpy, | 6 |

| | thermochemistry. | |
|---|---|---|
| 3 | Second law of thermodynamics; Carnot cycle, entropy and its applications, Third law, Helmholtz and Gibbs energies, useful and P-V work | 6 |
| | Exam1 | 1 |
| 4 | Phase equilibrium; phase diagrams; application of Clapeyron equation; phase transitions | 6 |
| 5 | Thermodynamic description of simple mixtures and applications to phase diagrams, properties of mixtures, ideal solutions and nonideality, activities and activity coefficients | 6 |
| | Midterm | 2 |
| 6 | Chemical equilibrium, Gibbs energy relationships, reaction spontaneity, External effects on reaction equilibrium, equilibrium electrochemistry. | 6 |
| 7 | Kinetic theory of gases, collisions, effusion, transport properties of gases, motion in liquids, diffusion laws, ion mobility | 9 |
| | Total | |

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | TeachingStrategies | AssessmentMethods |
|------|---|--|---|
| 1.0 | Knowledge | | |
| 1.1 | Recognize different types of gases, their properites and realted equations of states. | .Lectures PowerPoint presentation | **quizzes**assigned textbookproblems. |
| 1.2 | Explain the laws of thermodynamics and their applications to physical and chemical changes and properties, entropy calcualtion, Gibbs energy and chemical potential | Debate and discussion. Assignments (Co- operative &Individual assignments). | **assignments **Midterm exam **Final exam |
| 1.3 | Describe the features of phase diagrams for unary and binary systems. | | |
| 2.0 | Skills | | |
| 2.1 | Use thermodynamics equations and laws to calculate different parameters for specific processes. | .Lectures PowerPoint presentation | **quizzes**assigned textbookproblems. |
| 2.2 | Explain the interconversion of different types of energy in any given system. | Debate and discussion. Assignments (Co- operative &Individual assignments). | **assignments **Midterm exam **Final exam |

| Code | Course Learning Outcomes | TeachingStrategies | AssessmentMethods |
|------|---|--|--|
| 2.3 | Conduct chemical experiments using scientific devices in a safe and right manner. | Laboratory experiments | Lab reports Final practical exam |
| 3.0 | Competence | | |
| 3.1 | Bear self-learning responsibility and decision-making. | **The classroom strategy of student- | Evaluation of |
| 3.2 | Write reports and use various techniques to collect information. | teacher and student- student discussions and group. **work problem- solving encourages the development of these skills • Working in small groups *Individual & group research and assignments | individual & group works. **Evaluation of assignments. **Exams **Observation Card |

2. Assessment Tasks for Students

| # | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|--------------------------------------|----------|---|
| 1 | Quiz 1 | 5 | 5 |
| 2 | Midterm Written Theoretical Exam | 9 | 10 |
| 3 | Quiz2 | 13 | 5 |
| 4 | Assignments, Activities & Attendance | During | 10 |
| - | | Semester | |
| 5 | Final Practical Exam | 16 | 10 |
| 6 | Lab Reports | During | 10 |
| U | | semester | |
| 7 | Final Written Theoretical Exam | 17 | 50 |
| 8 | | | |

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice: . (include amount of time teaching staff are expected to be available each week)

• The presence of faculty members to provide advice, academic advice and academic guidance to the student in need within the six hours a week available to all students.

F. Learning Resources and Facilities

1.Learning Resources

| Required Textbooks | "Physical Chemistry," 9/e by P. Atkins and J. de Paula, W. H. Freeman and Co. (New York) 2010. | |
|-----------------------------------|---|--|
| Essential References Materials | Physical Chemistry Third Edition Gilbert W. Castellan, 1993 Physical Chemistry sixth Edition arthure W. adamson and alice p. gast, 1997 Physical Chemistry Understanding our Chemical World, Paul Monk, 2004 Physical Chemistry Third Edition Robert G. Mortimer, 2008, Elsevier Inc | |
| Electronic Materials | ectronic Materials Web site available through textbook www.whfreeman.com/pchem | |
| Other Learning Materials | | |

2. Facilities Required

| Item | Resources |
|---|---|
| Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) | Classrooms equipped with 40 seats. *Physical chemistry lab provided with different equipment. |
| Technology Resources (AV, data show, Smart Board, software, etc.) | • Smart board and display screen. Provision of computers for students training to be used in research on scientific topics that serve the course. |
| Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list) | spectrophotometer A sensitive balance Bomb calorimeter pH meter Conductimeter |

G. Course Quality Evaluation

| Evaluation Areas/Issues | Evaluators | Evaluation Methods |
|---|--|---|
| Effectiveness of teaching strategies. | Students | Direct Students feedback/ survey |
| Course contents and Learning resources | Students, Faculty and external reviewer. | Direct |
| Verifying Standards of Student Achievement | Independent member teaching staff | Direct, check marking and assessment methods. Analyzing results of students. |
| | | |
| | | |

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality oflearning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify) Assessment Methods(Direct, Indirect)

H. Specification Approval Data

| Council / Committee | |
|---------------------|--|
| Reference No. | |
| Date | |







Course Specifications

| Course Title: | Inorganic Chemistry (3) |
|----------------------|----------------------------------|
| Course Code: | 42021317 |
| Program: | Bachelor of Science in Chemistry |
| Department: | Chemistry |
| College: | Faculty of Science |
| Institution: | Albaha University |





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A. Course Identification

| 1. Credit hours: 3 credits | | | | |
|--|--|--|--|--|
| Course type | | | | |
| University College Department $$ Others | | | | |
| Required $$ Elective | | | | |
| Level/year at which this course isoffered: 5 th level /3 rd year | | | | |
| Pre-requisites for this course (if any):Inorganic Chemistry II (42021220) | | | | |
| | | | | |
| | | | | |
| 5. Co-requisites for this course (if any): None | | | | |
| | | | | |
| | | | | |
| 5. Co-requisites for this course (if any): None | | | | |

6. Mode of Instruction (mark all that apply)

| | (| | | | |
|----|-----------------------|----------------------|------------|--|--|
| No | Mode of Instruction | Contact Hours | Percentage | | |
| 1 | Traditional classroom | 45 | 100% | | |
| 2 | Blended | | | | |
| 3 | E-learning | | | | |
| 4 | Correspondence | | | | |
| 5 | Other | | | | |

7. Actual Learning Hours (based on academic semester)

| No | Activity | Learning Hours |
|--------|---------------------------------|----------------|
| Contac | t Hours | |
| 1 | Lecture | 45 |
| 2 | Laboratory/Studio | |
| 3 | Tutorial | |
| 4 | Others (specify) | |
| | Total | 45 |
| Other | Learning Hours* | |
| 1 | Study | 60 |
| 2 | Assignments | 15 |
| 3 | Library | 15 |
| 4 | Projects/Research Essays/Theses | |
| 5 | Others(specify): web search | 15 |
| | Total | 105 |

*The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times



B. Course Objectives and Learning Outcomes

1. Course Description

This course includes the following topics: chemistry of halogens, noble gases and their compounds, organometalic chemistry (metal carbonyls, nitrosylcomplexes, metal alkyls, carbenes and carbides, metallocenes); reactions of organometalic complexes; catalysis by organometallic compounds. Inorganic chemistry of biological systems: metalloporphyrins, Electron transfer reactions: mechanism of one electron transfer reactions, atom(or group)-transfer or inner-sphere mechanism, direct electron transfer reactions. Factors affecting the rate of direct electron transfer reactions, two electron transfer reactions. Corrosion theory, Passivity and polarization of metals. Superconductors and superconductivity.

2. Course MainObjective

- 1- Knowledge of the chemistryof halogens, noble gases.
- 2- Provide the students with the fundamentals knowledge of organometallic chemistry.
- 3- To introduce the students into important organometallic compounds and their biological importance.
- 4- To introduce Students to important reactions in organometallic chemistry and their mechanisms.
- 5- To provide students with basics of corrosion theory and superconductivity.

3. Course Learning Outcomes

| CLOs | | AlignedPLO s |
|------|--|-----------------|
| 1 | Knowledge: | |
| 1.1 | Define the introductory concepts in organometallic chemistry, superconductivity and reaction mechanisms. | 1-1 |
| 1.2 | Recall symbols, formulas, chemical equations for reactions of halogens, noble gases and important organometallic complexes. | 1-2 |
| 1.3 | Explain and interpret structure, chemical and physical properties, reaction mechanisms of organometallic compounds and electron deficient compounds. | 1-3 |
| 1.4 | | |
| 2 | Skills : | |
| 2.1 | Applying critical thinking in explaining the behavior and applications of organometalic compounds, halogens, noble gases and boranes. | 2-2 |
| 2.2 | | |
| 3 | Competence: | |
| 3.1 | Cooperate with his colleagues in teamwork and actively collaborate within one team in solving chemical problems related to organometallic compounds. | 3-1 |
| 3.2 | Bear self-learning responsibility and decision-making | 3-2 |
| 3.3 | | |

C. Course Content

| No | List of Topics | Contact Hours |
|----|--|------------------|
| 1 | Chemistry of Halogens: halogens in positive oxidation states, halides, | 6 |



| Total | | |
|--|--|---|
| | | |
| 13 | * Final exam | |
| | Superconductors and superconductivity | 3 |
| 12 | Passivity and corrosion | 3 |
| 11 | atom(or group)-transfer or inner-sphere mechanism, direct electron trans- sphere mechanism. Factors affecting the rate of direct electron transfer reactions. two electron transfer reactions. | 6 |
| 10 | Electron transfer reactions: mechanism of one electron transfer reactions | 5 |
| 10 | Inorganic chemistry of biological systems: metallonorphyrins | 3 |
| 9 | 9 Flectron-deficient compounds: Boranes | |
| 8 | Reactions of organometalic complexes; catalysis by organometallic compounds. Rule of organometalic chemistry in catalysis. | |
| 7 | Mid-term exam | 3 |
| 6 | metal alkyls, carbenes and carbides, metallocenes) | 3 |
| 5 | Nitrosylcomplexes: some metallic nitrosyls, preparations and properties | 3 |
| 4 | Transition metal carbonyls: synthesis and properties of simple metal carbonyls, structure and bonding in carbonyls. Effective atomic Number (EAN) rule as applied to metallic carbonyls | 3 |
| 3 | Organometalic chemistry: Introduction, organometalic compounds of the transition metals. | 3 |
| 2 | Noble gases and their compounds | 3 |
| of the halogens & Pseudohalogens. Halogen oxides | | |
| | interhalogen compounds, polyhalides, Pseudohalogens, electronegativity | |

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | TeachingStrategies | AssessmentMethods |
|------|--|--|--|
| 1.0 | Knowledge | | |
| 1.1 | Define the introductory concepts in organometallic chemistry, superconductivity and reaction mechanisms. | | |
| 1.2 | Recall symbols, formulas, chemical equations for reactions of halogens, noble gases and important organometallic complexes. | * Lectures * Discussion questions during class * Assignments | * Short quizzes * Mid-term exam * Final exam *Individual assignments |
| 1.3 | Explain and interpret structure, chemical and physical properties, reaction mechanisms of organometallic compounds and electron deficient compounds. | | |
| 2.0 | Skills | | |
| 2.1 | Applying critical thinking in explaining the behavior and applications of Organometallic | * Lectures* Discussion questions during class | * Short quizzes* Mid-term exam* Final exam |

| Code | Course Learning Outcomes | TeachingStrategies | AssessmentMethods |
|------|--|--|--|
| | compounds, halogens, noble gases and boranes. | * Assignments | *Individual and group assignments |
| | | | |
| 3.0 | Competence | | |
| 3.1 | Cooperate with his colleagues in teamwork and actively collaborate within one team in solving chemical problems related to organometallic compounds. | * Lecture preparation * Discussions * solving problems | Monitoring individual behavior during the class and group work. |
| 3.2 | Bear self-learning responsibility and decision-making | | |
| | | | |

2. Assessment Tasks for Students

| # | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|------------------|--------------------|---|
| 1 | Exam 1 | 5 | 10% |
| 2 | Mid-term Exam | 9 | 20% |
| 3 | Exam 2 | 13 | 10% |
| 4 | Assignments | During semester | 10% |
| 5 | Final exam | 17 | 50 % |
| 6 | | | |
| 7 | | | |
| 8 | | | |

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

Recommend faculty have 2 hours per week office hours available for student appointments.

F. Learning Resources and Facilities

1.Learning Resources

| Required Textbooks | Advanced Inorganic Chemistry (6th edition), Cotton, F. Albert; Wilkinson, G.; Murillo, C. A. (1999); New York: Wiley-Interscience (ISBN 978-0-471-19957-1 - John Wiley & Sons) 2- Inorganic Chemistry, Principles of structure and reactivity, 4th edition. J.E.Huheey and others. 3-Descriptive Inorganic Chemistry, 4th edition, G. Rayner-Canham and T. Overton, 2006. |
|-----------------------------------|---|
| Essential References Materials | 1- Inorganic Chemistry (4 th edition); by: Catherine E. Housecroft and Alan G. Sharpe. (chapter 19 and 20). |

| | 2- Advanced Inorganic Chemistry (volume II); by: Staya Prakash, G.D. Tuli, SK. Basu and R.D. Madan. 3- Coordination Chemistry (2008); by Joan RibasGispert ; Publisher: Wiley-VCH (May 5, 2008); ISBN-10: 352731802X; ISBN-13: 978- 3527318025. |
|-----------------------------|--|
| Electronic Materials | None |
| Other Learning Materials | None |

2. Facilities Required

| Item | Resources |
|---|--|
| Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) | * Lecture room with tables and/or movable chairs for student group work. |
| Technology Resources (AV, data show, Smart Board, software, etc.) | * Smart Board |
| Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list) | |

G. Course Quality Evaluation

| Evaluation Areas/Issues | Evaluators | Evaluation Methods |
|---|--|---|
| Effectiveness of teaching strategies. | Students | Direct Students feedback/ survey |
| Course contents and Learning resources | Students, Faculty and external reviewer. | Direct |
| Verifying Standards of Student Achievement | Independent member teaching staff | Direct, check marking and assessment methods. Analyzing results of students. |
| | | |
| | | |

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality oflearning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify) Assessment Methods(Direct, Indirect)

H. Specification Approval Data

| Council / Committee | |
|---------------------|--|
| Reference No. | |
| Date | |







Course Specifications

| Course Title: | Analytical Chemistry (1) |
|----------------------|---|
| Course Code: | 42021309 |
| Program: | Bachelor of Science in Chemistry |
| Department: | Chemistry |
| College: | Faculty of Science |
| Institution: | Al-Baha University |





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| 2. Facilities Required | 7 |
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A. Course Identification

| 1. Credit hours: 4 credit hours (3T+1P) | | | |
|---|--|--|--|
| 2. Course type | | | |
| a. University College Department × Others | | | |
| b. Required × Elective | | | |
| 3. Level/year at which this course is offered: 3rd year / 5 th level | | | |
| 4. Pre-requisites for this course (if any): General Chemistry (1) (42020102) | | | |
| | | | |
| | | | |
| 5. Co-requisites for this course (if any): None | | | |
| | | | |
| | | | |

6. Mode of Instruction (mark all that apply)

| No | Mode of Instruction | Contact Hours | Percentage |
|----|-----------------------|----------------------|------------|
| 1 | Traditional classroom | 75 | 100% |
| 2 | Blended | | |
| 3 | E-learning | | |
| 4 | Correspondence | | |
| 5 | Other | | |

7. Actual Learning Hours (based on academic semester)

| No | Activity | Learning Hours | |
|--------|---------------------------------|----------------|--|
| Contac | Contact Hours | | |
| 1 | Lecture | 45 | |
| 2 | Laboratory/Studio | 30 | |
| 3 | Tutorial | | |
| 4 | Others (specify) | | |
| | Total | 75 | |
| | Other Learning Hours* | | |
| 1 | Study | 45 | |
| 2 | Assignments | 15 | |
| 3 | Library | 15 | |
| 4 | Projects/Research Essays/Theses | | |
| 5 | Others(specify) | | |
| | Total | 75 | |

*The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description

Lectures: This course is designed to give general introduction to Analytical Chemistry1, topics may include: calculations used, errors in chemical analysis, statistical data treatment, Aqueous Equilibria. Also the course encompasses titrimetric study of methods for Analysis acid-base system, neutralization, titration curves, mixtures of strong and weak acids and bases. This the course also covers the study of gravimetric methods of analysis

Labs: The labs will provide student with skill and an opportunity to study volumetric and gravimetric analysis.. The laboratory will include Preparing a standard solution,

standardization, determination of the normality, determination of unknown concentration oxidation – reduction reaction and techniques to determine the mass or concentration of a substance by measuring a change in mass.

2. Course MainObjective

The main purpose of this course is to help the students to learn and understand several concepts in Analytical Chemistry1:-

- The fundamentals of statistical data analysis,
- Application of chemical equilibria to gravimetric and titrimetric analysis.
- Applying this fundamental knowledge in solving problems typical to those encountered by analytical chemists.

3. Course Learning Outcomes

| | CLOs | AlignedPLO s |
|-----|--|-----------------|
| 1 | Knowledge: | |
| 1.1 | Define the principles and concept of basics of analytical chemistry. | 1.1 |
| 1.2 | Explain the principle and basic of volumetric and gravimetric and its applications in different fields. | 1.3 |
| 2 | Skills : | |
| 2.1 | Use laws and calculations in solving statistical, volumetric, gravimetric and concentration problems | 2.1 |
| 2.2 | Apply creative thinking in providing innovative solutions to the volumetric and gravimetric problems. | 2.2 |
| 2.3 | Use different techniques, methods and tests in statiscal ,volumetric and gravimetricanalysis and interpretation of results and explain the concepts, information and new evidences and evaluate it from different sources. | 2.3 |
| 2.4 | Conduct chemical experiments using scientific devices in a safe and right manner. | 2.4 |
| 3 | Competence: | |
| 3.1 | Bear self-learning responsibility and decision-making. | 3.2 |
| 3.2 | Write reports and use various techniques to collect and analyze information. | 3.3 |

C. Course Content

| No | List of Topics | Contact Hours |
|----|---|------------------|
| 1 | Analytical Chemistry: Intro and calculations used | 3 |
| 2 | Errors in Chemical Analysis: Accuracy, systematic errors, types of systematic errors | 3 |
| 3 | Random errors in Chemical Analysis: Nature of random errors, statistical treatment, standard deviation | 3 |
| 4 | Statistical data treatment: confidence intervals, hypothesis testing, analysis of variance. *Exam 1 | 3 |
| 5 | Aqueous Equilibria: Electrolytes, acid-base, buffers | 6 |
| 6 | Electrolytes and Equilibria: Ionic charge, ionic strength, activity coefficients *Exam 2 | 6 |
| 7 | Equilibrium Problems for Complex Systems: Mass-balance equations, charge- balance equations, multiple equilibrium calculations *Midterm | 6 |
| 8 | Titrimetric Methods of Analysis; Acid-base system, neutralization, titration curves, mixtures of strong and weak acids and bases, polyfunctional acids and bases, amphiprotic species | 9 |
| 9 | Gravimetric methods of analysis | 6 |
| | Total | 45 |

D. Teaching and Assessment 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | TeachingStrategies | AssessmentMethods |
|------|---|--|--|
| 1.0 | Knowledge | | |
| 1.1 | Define the principles and concept of basics of analytical chemistry. | LecturesDebate and | • Evaluation of interaction and |
| 1.2 | Explain the principle and basic of volumetric and gravimetric and its applications in different fields. | discussion • Assignments (Co- operative &Individual). Working in small groups | presentation of summaries and reports during lectures. Evaluation of assignments. Quizzes. Midterm exam. Final written exams |
| | | | |
| 2.0 | Skills | | |
| 2.1 | Use laws and calculations in solving statistical, volumetric , gravimetric and concentration problems | Lectures Assignments Working in small groups | *Quizzes. *Midterm exam. *Final written theoretical exam. |

| Code | Course Learning Outcomes | TeachingStrategies | AssessmentMethods |
|-------|---|--|---|
| | | | *Evaluation of assignments |
| 2.2 | Apply creative thinking in providing innovative solutions to the volumetric and gravimetric problems. | Team work- Assignments-student presentation-reporting- Scientific media- Training on scientific drawing, reading slides and reporting-Lab work Co-operative & Individual assignments. Cooperative Learning. | • Evaluation of individual & group works. |
| 2.3 | Use different techniques, methods and tests in statiscal ,volumetric and gravimetricanalysis and interpretation of results and explain the concepts, information and new evidences and evaluate it from different sources. | • Working in small groups Individual & group research | • Evaluation of individual & group works. Observation Card |
| 2.4 | Conduct chemical experiments using scientific devices in a safe and right manner. | *Laboratory experimentation | *Lab reports *Final lab exam |
| 3.0 | Competence | | |
| 3.1 | Bear self-learning responsibility and decision-making. | Team work small groups and the distribution of roles. PowerPoint presentation. *Writing reports | Oral discussion Report evaluation |
| 3.2 | Write reports and use various techniques to collect and analyze information. | small groups and the distribution of roles. PowerPoint presentation. Writing reports | Oral discussion Report evaluation Observation cards Final lab exam |
| • • • | | | |

2. Assessment Tasks for Students

| # | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|------------------|----------|---|
| 1 | Quiz 1 | 5 | 5% |
| 2 | Mid-term Exam | 9 | 20% |
| 3 | Quiz 2 | 13 | 5 |
| 4 | Lab report | During | 10% |
| 4 | | semester | |
| 5 | Lab final | 16 | 10% |
| 6 | Final exam | 17 | 50% |

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice : Recommend faculty have 2 hours per week office hours available for student appointments.

F. Learning Resources and Facilities

1.Learning Resources

| Required Textbooks | Fundamentals of Analytical Chemistry - 8 th Edition; Skoog, West, Holler, Crouch, Brooks/Cole |
|-----------------------------------|---|
| Essential References Materials | None beyond the standard library holdings sufficient to qualify for NCAAA. |
| Electronic Materials | The textbook has a support package for students that includes: "Applications of Microsoft® Excel in Analytical Chemistry", interactive CD-ROM, companion website and access to InfoTrac® a database of articles form top journals. |
| Other Learning Materials | LabVIEW http://sine.ni.com/nips/cds/view/p/lang/en/nid/207573 |

2. Facilities Required

| Item | Resources |
|---|--|
| Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) | Lecture room with tables and/or movable chairs for 40 student group work. ** Analytical Chemistry laboratory (16-20 students capacity) equipped with necessary lab glassware, chemicals and instruments. |
| Technology Resources (AV, data show, Smart Board, software, etc.) | In-class computers would allow for online tests rather than paper and pencil, but this is not essential. (Personal lab tops could also be used if electrical connections for power cords are in the room.) |
| Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list) | • Analytical chemistry laboratory. |

G. Course Quality Evaluation

| Evaluation Areas/Issues | Evaluators | Evaluation Methods |
|------------------------------|-----------------------|---------------------------|
| Effectiveness of teaching | Students | Direct Students feedback/ |
| strategies. | | survey |
| Course contents and Learning | Students, Faculty and | Direct |
| resources | external reviewer. | Direct |

| Evaluation Areas/Issues | Evaluators | | Evaluation Methods | |
|---|----------------------------|--------|---|--|
| Verifying Standards of Student Achievement | Independent teaching staff | member | Direct, check marking and assessment methods. Analyzing results of students. | |
| | | | | |
| | | | | |

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify) Assessment Methods(Direct, Indirect)

H. Specification Approval Data

| Council / Committee | |
|---------------------|--|
| Reference No. | |
| Date | |







Course Specifications

| Course Title: | PetroleumChemistry |
|---------------|---|
| Course Code: | 42021321 |
| Program: | Bachelor of Science in Chemistry |
| Department: | Chemistry |
| College: | Faculty of Science |
| Institution: | Albaha University |





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A. Course Identification

| 1. (| Credit hours: 2credit hrs. (2T) | | |
|---|---|--|--|
| 2. C | Course type | | |
| a. | University College Department $$ Others | | |
| b. | Required $$ Elective | | |
| 3. I | Level/year at which this course is offered: Level 5, third year | | |
| 4. I | 4. Pre-requisites for this course (if any):Organic Chemistry 2 (42021214) | | |
| | | | |
| | | | |
| 5. Co-requisites for this course (if any): none | | | |
| | | | |
| | | | |

6. Mode of Instruction (mark all that apply)

| No | Mode of Instruction | Contact Hours | Percentage |
|----|-----------------------|----------------------|------------|
| 1 | Traditional classroom | 30 | 100% |
| 2 | Blended | | |
| 3 | E-learning | | |
| 4 | Correspondence | | |
| 5 | Other | | |

7. Actual Learning Hours (based on academic semester)

| No | Activity | Learning Hours |
|-----------------------|---------------------------------|----------------|
| Contac | t Hours | |
| 1 | Lecture | 30 |
| 2 | Laboratory/Studio | |
| 3 | Tutorial | |
| 4 | Others (specify) | |
| | Total | 30 |
| Other Learning Hours* | | |
| 1 | Study | 30 |
| 2 | Assignments | 15 |
| 3 | Library | 15 |
| 4 | Projects/Research Essays/Theses | |
| 5 | Others(specify) | |
| | Total | 60 |

*The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times



B. Course Objectives and Learning Outcomes

1. Course Description

• Lectures: This course is designed to give a broad overview of Crude Oil Processing and Production of Hydrocarbon, Hydrocarbon Intermediates, Primary raw materials for petrochemicals and petrochemical industries, the nature, origin and chemical composition of crude oil, Chemicals based on methane, ethane, propane, butanes, ethylene, propylene, butylenes, butadienes, benzene, toluene, xylenes and polymers based petroleum.

2. Course MainObjective

3 Course Learning Outcomes

- 1- To provide students with basic background in petroleum chemistry and provide students with necessary skills and abilities needed in the petrochemical and petroleum industrial field.
- 2- Expose students to the knowledge of Crude Oil Processing and Production of Hydrocarbon, Hydrocarbon Intermediates, Primary raw materials for petrochemicals and petrochemical industries.
- 3- Give students a broad perception to define the basis of Origen of petroleum, the treatment and purification of crude oil, physical and chemical separation of crude oil and the distillation products of petroleum and its uses.
- 4- Understanding the chemical reactions involved in the distillation processes.
- 5- Know the physical and chemical properties of petroleum based polymer compounds.

| 0.0 | | |
|-----|--|-----------------|
| | CLOs | AlignedPLO s |
| 1 | Knowledge: | |
| 1.1 | Define the general concepts and terms of origin and chemical composition of petroleum | 1.1 |
| 1.2 | Recall the Treatment, Purification of crude petroleum and production of hydrocarbons. | 1.2 |
| 1.3 | Explain the methods led to the chemicals based on the small molecules of hydrocarbons and their importance and uses in life. | 1.3 |
| 1 | | |
| 2 | Skills : | |
| 2.1 | Explain the chemistry of petroleum processes, their distillation and refining | 2.1 |
| 2.2 | Explain the methods of preparation of petrochemicals based on intermediate hydrocarbons, the important and uses of the petrochemicals. | 2.2 |
| | | |
| 3 | Competence: | |
| 3.1 | Compete in online researching on petrochemicals individually and in team and actively collaborate within in solving chemical problems and serving the community. | 3.1 |
| | | |

C. Course Content

| No | List of Topics | Contact Hours |
|----|----------------|------------------|
|----|----------------|------------------|

| 1 | Introduction, origin, theories of the origin of crude oil, chemical composition of crude oil. | 2 |
|----|---|----|
| 2 | Treatment, Purification of crude petroleum. | 2 |
| 3 | Crude Oil Processing and Production of Hydrocarbon Intermediates. | 3 |
| 4 | Hydrocarbon Intermediates | 2 |
| | Exam 1 | 1 |
| 5 | Nonhydrocarbon Intermediates | 2 |
| 6 | Chemicals based on methane | 2 |
| 7 | Ethane and higher paraffins-based chemicals | 2 |
| 8 | Chemical based on Ethylene | 2 |
| | Mid Term Exam | 1 |
| 9 | Chemicals based on Propylene | 2 |
| 10 | Chemicals based on butylenes | 2 |
| 11 | Butadienes-based chemicals | 2 |
| | Exam 2 | 1 |
| 12 | Chemicals based on benzene, toluene, and xylenes | 2 |
| 13 | petroleum based polymers | 2 |
| | Final Exam | |
| | Total | 30 |

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | TeachingStrategies | AssessmentMethods |
|------|---|--|--|
| 1.0 | Knowledge | | |
| 1.1 | Define the general concepts and terms of origin and chemical composition of petroleum | LecturesDebate and discussion | Written assignments.QuizzesMidterm exam. |
| 1.2 | Recall the Treatment, Purification of crude petroleum and production of hydrocarbons. | Working in small groups • Individual & | • Final written exams. |
| 1.3 | Explain the methods led to the chemicals based on the small molecules of hydrocarbons and their importance and uses in life. | group assignments | |
| | | | |
| 2.0 | Skills | | |
| 2.1 | Explain the chemistry of petroleum processes, their distillation and refining | LecturesDebate and discussion. | • Written assignments. • Quizzes • Midterm exam |
| 2.2 | Explain the methods of preparation of petrochemicals based on intermediate hydrocarbons, the important and uses of the petrochemicals. | Cooperative Learning Working in small groups Individual & group assignments | • Final written exams |
| 3.0 | Competence | | · |

| Code | Course Learning Outcomes | TeachingStrategies | AssessmentMethods |
|------|--|---|---|
| 3.1 | Compete in online researching on petrochemicals individually and in team and actively collaborate within in solving chemical problems and serving the community. | **Individual and team work and Assignments **Student presentation ** Writing reports | Evaluation of individual & group works. Observation Card |

2. Assessment Tasks for Students

| # | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|--------------------------|-----------------|---|
| 1 | Quiz 1 | 5 | 5 |
| 2 | Midterm Theoretical Exam | 9 | 20 |
| 3 | Quiz2 | 13 | 5 |
| 4 | Assignments& Activities | During Semester | 20 |
| 7 | Final Exam | 17 | 50 |

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- The presence of faculty members to provide advice, academic advice and academic guidance to the student in need within the six hours a week available to all students.
- Arrange extra hours gifted students or Program for students who default in scholastic achievement

F. Learning Resources and Facilities

1.Learning Resources

| Required Textbooks | Chemistry of Petrochemical Processes, 2 nd Edition, Sami Matar, and Lewis F. Hatch, Gulf Publishing Company, Houston, TX, 2000. |
|-----------------------------------|--|
| Essential References Materials | Standard library holdings sufficient to qualify for American Chemical Society certification (addressed in program specifications document). Interlibrary loan should be available through King Fahd University (or other University with a petroleum program) for specific content journals not available on campus Modern Petroleum Technology, 6 th Edition, edited by Richard A. Dawe and Alan G. Lucas, Chichester: John Wiley, 2000. |
| Electronic Materials | <u>https://en.wikipedia.org/wiki/Petroleum_refining_processes</u>. <u>https://en.wikipedia.org/wiki/Petroleum</u>. <u>https://en.wikipedia.org/wiki/Petrochemical</u>. There are also YouTube sites and animation can be found, including <u>https://www.youtube.com/watch?v=2xzYf8IL_FE</u>. |

| | <u>https://www.youtube.com/watch?v=ptj4FbjLeT0</u> |
|-----------------------------|--|
| Other Learning Materials | |

2. Facilities Required

| Item | Resources |
|---|---|
| Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) | • Classrooms equipped with smart board and display screen for (40) students |
| Technology Resources (AV, data show, Smart Board, software, etc.) | Provision of computers for students training to be used in research on scientific topics that serve the course. |
| Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list) | NA |

G. Course Quality Evaluation

| Evaluation Areas/Issues | Evaluators | Evaluation Methods | |
|---|--|---|--|
| Effectiveness of teaching strategies. | Students | Direct Students feedback/ survey | |
| Course contents and Learning resources | Students, Faculty and external reviewer. | Direct | |
| Verifying Standards of Student Achievement | Independent member teaching staff | Direct, check marking and assessment methods. Analyzing results of students. | |
| | | | |

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Qualityof learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, PeerReviewer, Others (specify) Assessment Methods (Direct, Indirect)

H. Specification Approval Data

| Council / Committee | | | |
|---------------------|--|--|--|
| Reference No. | | | |
| Date | | | |







Course Specifications

| Course Title: | Biochemistry 1 |
|----------------------|---|
| Course Code: | 42021319 |
| Program: | Bachelor of Science in Chemistry |
| Department: | Chemistry |
| College: | Faculty of Science |
| Institution: | Albaha University |





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| 2. Facilities Required | 8 |
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| H. Specification Approval Data | |

A. Course Identification

| 1. Credit hours: 4 credit hours (3T+1P) | | | |
|--|--|--|--|
| 2. Course type | | | |
| a. University College Department $$ Others | | | |
| b. Required $$ Elective | | | |
| 3. Level/year at which this course is offered: 5 th level / 3 rd year | | | |
| 4. Pre-requisites for this course (if any):Organic Chemistry 2 (42021214) | | | |
| | | | |
| | | | |
| 5. Co-requisites for this course (if any): | | | |
| None | | | |
| | | | |

6. Mode of Instruction (mark all that apply)

| ······································ | | | | |
|--|-----------------------|----------------------|------------|--|
| No | Mode of Instruction | Contact Hours | Percentage | |
| 1 | Traditional classroom | 75 | 100% | |
| 2 | Blended | | | |
| 3 | E-learning | | | |
| 4 | Correspondence | | | |
| 5 | Other (Laboratory) | | | |

7. Actual Learning Hours (based on academic semester)

| No | Activity | Learning Hours | | | |
|--------|---------------------------------|----------------|--|--|--|
| Contac | et Hours | | | | |
| 1 | Lecture | 45 | | | |
| 2 | Laboratory/Studio | 30 | | | |
| 3 | Tutorial | | | | |
| 4 | Others (specify) | | | | |
| | Total | 75 | | | |
| Other | Other Learning Hours* | | | | |
| 1 | Study | | | | |
| 2 | Assignments | | | | |
| 3 | Library | | | | |
| 4 | Projects/Research Essays/Theses | | | | |
| 5 | Others(specify) | | | | |
| | Total | | | | |

*The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times



B. Course Objectives and Learning Outcomes

1. Course Description

Course Description:

Lectures: This course is designed to give a broad overview of the foundations of biochemistry, with an emphasis on organic chemistry. Topics include: structure and properties of water, Amino acids structures, peptides, carbohydrates, lipids, proteins, and nucleic acids; and vitamins - Fat soluble vitamins - Water soluble vitamins, Endocrine glandMembranes; membrane bilayers and transport across membranes.

Labs: The labs will provide student with an opportunity to identify and study commonly of water, carbohydrates, Amino acids, peptides, lipids, proteins. Emphasis will be placed on the Precautions and safety rules and the safety in the chemical laboratory. The laboratory will include determination of Physical properties of unknown, Molish's test, Iodine test, Benedict's test, Fehling test, Ketose test. Barfoed's test, Biuret's test, Heat coagulation test, Folin's test, Millon's test, Acrolin's test. Lieberman's test, and Sodium hypobromite test

2. Course MainObjective

The objectives of this course are to:

1-Tointroduce students to the foundations of the basic concepts of Biochemistry.

2- Expose students to the knowledge of biochemistry and know the structure and function of carbohydrates, amino acids, peptides, proteins, lipids, and nucleic acid compounds

3. Course Learning Outcomes

| | AlignedPLO s | |
|-----|--|-----|
| 1 | Knowledge: | |
| 1.1 | Define the general concepts and terms related to biochemistry such as | 1.1 |
| | amino acid, enzymes, proteins, lipids, carbohydrates, nucleic acids, hormones, vitamins and properties of water | |
| 1.2 | Recall the molecular structures, the physical and the chemical properties of amino acids, peptides, monosaccharides, disaccharides, polysaccharides, proteins primary, secondary tertiary and quaternary, enzymes, fatty acids, lipids and nucleic acids. | 1.2 |
| 1.3 | Explain the different classes and types of carbohydrate, amino acids, fatty acids, lipids, vitamins, hormones and nucleic acids. | 1.3 |
| 1.4 | | |
| 2 | Skills : | |
| 2.1 | Show and Draw the chemical structure of some monosaccharides, | 2.1 |
| | disaccharides, amino acids, peptides, fatty acids, triglycerides and nucleotides. | |
| 2.2 | Compare and contrast (structure and location) between the types of nucleic acids, polysaccharides and enzyme inhibitors. | 2.2 |
| 2.3 | Explain the models of enzyme, its mechanism of action and regulation. | 2.3 |
| 2.4 | Present and interpret results obtained from using practical techniques | 2.4 |
| 3 | Competence: | |
| 3.1 | Solve problems and assignments individually. | 3.1 |
| 3.2 | Cooperate with his colleagues in teamwork and actively collaborate within one team in solving chemical problems and serving the | 3.2 |



| CLOs | | | | |
|--|---|--|--|--|
| community. | | | | |
| Write reports using various techniques to collect and analyze information and presenting it to others. | 3.3 | | | |
| | CLOs community. Write reports using various techniques to collect and analyze information and presenting it to others. | | | |

C. Course Content

| No | List of Topics | Contact Hours |
|----|--|------------------|
| 1 | Introduction to the course | 2 |
| 2 | Review: Water, It's properties and effects | 2 |
| 3 | Review: Amino Acids and Peptides | 2 |
| 4 | Protein composition and primary/secondary structure; protein purification & amino acid sequencing and quantization | 4 |
| 5 | Protein tertiary and quaternary structure, and protein function: ligand binding and allostery; protein regulation | 4 |
| 6 | Enzyme catalysis and kinetics | 2 |
| | Exam 1 | |
| 7 | Enzyme mechanisms and regulation | 2 |
| 8 | Mono- and Disaccharides: Review of nomenclature, structure and properties | 4 |
| 9 | Polysaccharides, structure properties and analysis | |
| 10 | Structure & Properties of Nucleic acids and Nucleopeptides | 4 |
| 11 | Lipids, occurrence and properties; Cholesterol & lipoproteins | 3 |
| 12 | Composition and structure of Membranes; membrane bilayers and transport across membranes | 2 |
| | Midterm Exam | |
| 13 | Vitamins: Water soluble vitamins | 2 |
| 14 | Fat soluble vitamins | 2 |
| 15 | Endocrine gland: Review | 2 |
| 16 | Pituitary Hormones | 2 |
| | Exam 2 | |
| 17 | Thyroid and Parathyroid Hormones | 2 |
| 18 | Adrenal Hormonal gland and Sex Hormones | 2 |
| | Final Exam | |
| | Total | 45 |

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | TeachingStrategies | AssessmentMethods |
|------|--|--|---|
| 1.0 | Knowledge | | |
| 1.1 | Define the general concepts and terms related to biochemistry such as amino acid, enzymes, proteins, lipids, carbohydrates, nucleic acids, hormones, vitamins and properties of water | Lectures Debate and discussion PowerPoint presentation | Evaluation of assignments and participating in discussions. Quizzes. |

| Code | Course Learning Outcomes | TeachingStrategies | AssessmentMethods |
|------|---|---|---|
| 1.2 | Recall the molecular structures, the physical and the chemical properties of amino acids, monosaccharides, disaccharides, polysaccharides, proteins primary, secondary and tertiary, nucleic acids and some hormones. | Cooperative Learning Working in small groups Individual & group assignments | • Midterm exam *Final written exams. |
| 1.3 | Explain the different classes of carbohydrate, Amino acids, lipids, Vitamins, Hormones and their function groups and the purification techniques for proteins. | | |
| 1.4 | | • | |
| 2.0 | Skills | | |
| 2.1 | Show and Draw the chemical structure of some monosaccharides, disaccharides, amino acids, peptides, fatty acids, triglycerides and nucleotides. | Lectures Debate and discussion. Cooperative Learning | Evaluation of assignments and participating in discussions. Quizzes. |
| 2.2 | Compare and contrast (structure and location) between the types of nucleic acids, polysaccharides and enzyme inhibitors. | • Working in small groups Individual & group assignments | • Midterm exam *Final written exams. |
| 2.3 | Explain the models of enzyme, its mechanism of action and regulation. | Lectures Debate and discussion. Cooperative Learning Working in small groups Individual & group research | Evaluation of assignments and participating in discussions. Quizzes. Midterm exam. *Final written exams. |
| | Present and interpret results obtained | Training on lab | Lab reports. |
| 2.4 | from using practical techniques | experiments and reporting-Lab work | Practical exams. |
| 3.0 | Competence | | |
| 3.1 | Solve problems and assignments individually. | Individual work- Assignments student presentation | Evaluation of individual works. |
| 3.2 | Cooperate with his colleagues in teamwork and actively collaborate within one team in solving chemical problems and serving the community. | Individual & Team work- Assignments- student presentation- reporting- Scientific media- reporting-Lab work | **Evaluation of individual & group works. ** reports evaluation Observation Card |
| 3.3 | Write reports using various techniques to collect and analyze information and | • Working in small | • Evaluation of |

| Code | Course Learning Outcomes | TeachingStrategies | AssessmentMethods |
|------|--------------------------|--|---|
| | presenting it to others. | groups Individual & group research | individual & group works. • Laboratory reports Observation Card |
| | | | |

2. Assessment Tasks for Students

| # | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|--------------------------------------|----------|---|
| 1 | Quiz 1 | 5 | 5% |
| 2 | Mid-term Exam | 9 | 10% |
| 3 | Quiz 2 | 13 | 5% |
| 4 | Assignments, Activities & Attendance | During | 10% |
| 4 | | Semester | |
| 5 | Lab report | During | 10% |
| 3 | | semester | |
| 6 | Lab final | 16 | 10% |

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

• The presence of faculty members to provide advice, academic advice and academic guidance to the student in need within the six hours a week available to all students.

F. Learning Resources and Facilities

| 1.Learning Resources | |
|-----------------------------|--|
| | |

| Required Textbooks | Note book of chemistry department | | |
|-----------------------------------|--|--|--|
| Essential References Materials | Moran, Horton, Scrimgeour, & Perry (2012). Principles of Biochemistry, 5 th edition. Prentice Hall. 9780321707338 | | |
| Electronic Materials | <u>http://themedicalbiochemicalpage.org.</u> <u>http://www.bio.cmu.edu/Courses/BiochemMols/BCMolecules</u> <u>.html</u> <u>https://en.wikipedia.org/wiki/Carbohydrate</u>. <u>https://en.wikipedia.org/wiki/Protein</u>. <u>https://en.wikipedia.org/wiki/Amino_acid</u>. <u>https://en.wikipedia.org/wiki/Lipid</u> | | |
| Other Learning Materials | Nelson, David and Michael Cox, Lehninger <i>Principles of Biochemistry</i> , 5 th ed., 2006, NY: W.H. Freeman Publishers, Inc. ISBN: 0-7167-7108-X | | |

2. Facilities Required

| Item | Resources |
|---|--|
| Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) | •Classrooms equipped with smart board and display screen for (40) students Practical labs provided with glass wares, reagents, melting point apparatus and different equipment for (20- 25) students |
| Technology Resources (AV, data show, Smart Board, software, etc.) | Data show, smart board, projector. |
| Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list) | Reagents Glass tubes A sensitive balance. *Chemicals. |

G. Course Quality Evaluation

| Evaluation Areas/Issues | Evaluators | Evaluation Methods | |
|---|--|---|--|
| Effectiveness of teaching strategies. | Students | Direct Students feedback/ survey | |
| Course contents and Learning resources | Students, Faculty and external reviewer. | Direct | |
| Verifying Standards of Student Achievement | Independent member teaching staff | Direct, check marking and assessment methods. Analyzing results of students. | |
| | | | |

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality oflearning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify) Assessment Methods(Direct, Indirect)

H. Specification Approval Data

| Council / Committee | | |
|---------------------|--|--|
| Reference No. | | |
| Date | | |