

**Kingdom of Saudi Arabia**

**The National Commission for Academic Accreditation & Assessment**

**King Saud University**

**College of Science**

**B.SC. Program in Chemistry**

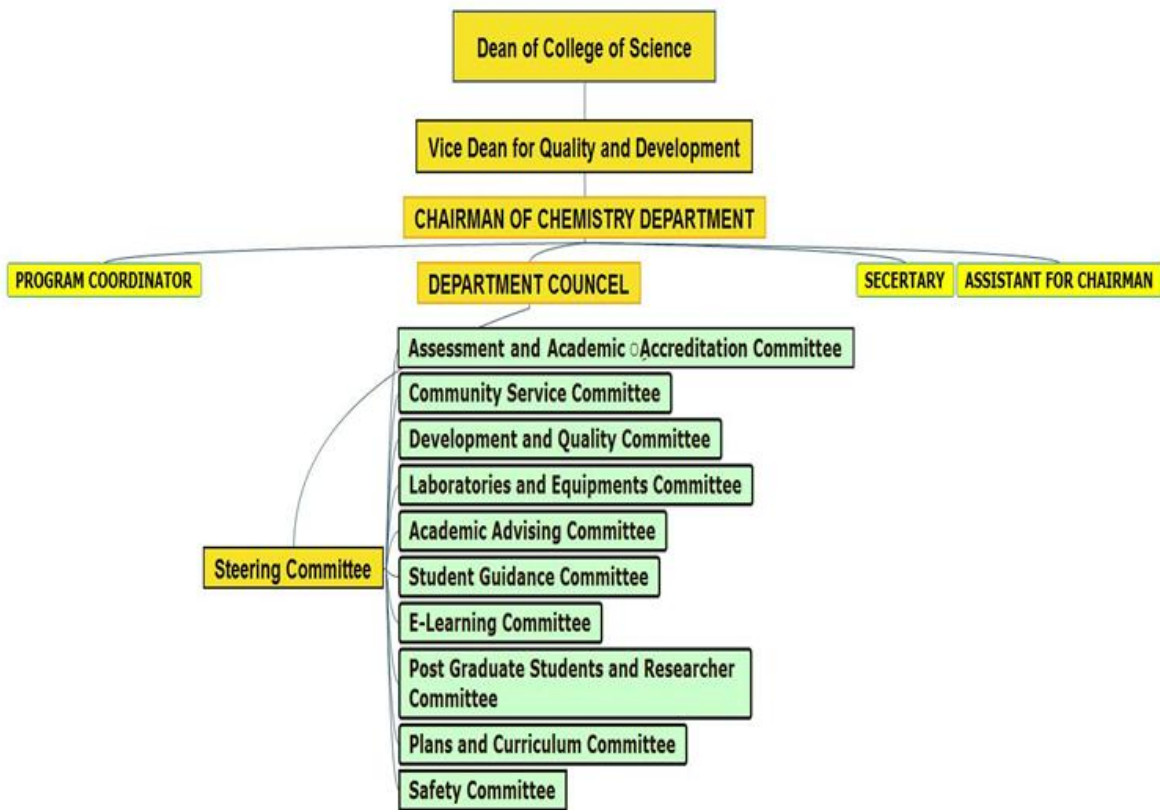
**Program Specifications  
(PS)**

**2017**

## National Commission for Academic Accreditation & Assessment

### Program Specifications

For guidance on the completion of this template, please refer to NCAAA guidebooks.

|                                      |  |                               |
|--------------------------------------|--|-------------------------------|
| 1. Institution                       | King Saud University   | Date of Report: November 2016 |
| 2. College/Department:               | College of Science / Department of Chemistry   |                               |
| 3. Dean :                            | Professor. Nasser Aldaghri   |                               |
| 4. Program administrative flowchart: |  <pre> graph TD     Dean[Dean of College of Science] --&gt; Vice[Vice Dean for Quality and Development]     Vice --&gt; Chairman[CHAIRMAN OF CHEMISTRY DEPARTMENT]     Chairman --&gt; ProgCoord[PROGRAM COORDINATOR]     Chairman --&gt; DeptCoun[DEPARTMENT COUNCIL]     Chairman --&gt; Sec[SECRETARY]     Chairman --&gt; Asst[ASSISTANT FOR CHAIRMAN]     DeptCoun --&gt; AssCom[Assessment and Academic Accreditation Committee]     DeptCoun --&gt; CommCom[Community Service Committee]     DeptCoun --&gt; DevCom[Development and Quality Committee]     DeptCoun --&gt; LabCom[Laboratories and Equipments Committee]     DeptCoun --&gt; AdvCom[Academic Advising Committee]     DeptCoun --&gt; SteerCom[Steering Committee]     DeptCoun --&gt; StGuidCom[Student Guidance Committee]     DeptCoun --&gt; ELCom[E-Learning Committee]     DeptCoun --&gt; PostGradCom[Post Graduate Students and Researcher Committee]     DeptCoun --&gt; PlansCom[Plans and Curriculum Committee]     DeptCoun --&gt; SafetyCom[Safety Committee]     </pre> |                               |

5. List all branches/locations offering this program

Branch/Location:

Main Campus

#### A. Program Identification and General Information

1. Program title and code

Title: **Chemistry**

Code: **CHEM**

2. Total credit hours needed for completion of the program

**136 hrs**

3. Award granted on completion of the program

**Bachelor Degree of Science in Chemistry (B.Sc. in Chemistry)**

4. Major tracks/pathways or specializations within the program (eg. transportation or structural engineering within a civil engineering program or counselling or school psychology within a psychology program)

**Pure Chemistry Program.**

5. Intermediate Exit Points and Awards (if any) (eg. associate degree within a bachelor degree program)

**Not applicable.**

6. Professional occupations (licensed occupations, if any) for which graduates are prepared. (If there is an early exit point from the program (eg. diploma or associate degree) include professions or occupations at each exit point)

- Governmental and private sectors' Chemical laboratories
- Quality control laboratories in pharmaceutical, food, mining, detergents and other Chemical industries
- Petroleum and petrochemical industry

| <ul style="list-style-type: none"> <li>Environmental protection agencies</li> <li>Research &amp; development laboratories</li> <li>International intergovernmental bodies.</li> <li>Water treatment stations</li> </ul>   |   |             |      |              |  |  |                      |   |  |
|---|---|-------------|------|--------------|--|--|----------------------|---|--|
| <p>7. (a) New Program <input type="checkbox"/> Planned starting date <input style="width: 100px;" type="text"/></p> <p>(b) Continuing Program <input checked="" type="checkbox"/> Year of most recent major program review <input style="width: 100px; text-align: center;" type="text" value="2010"/></p> <p>Organization involved in recent major review (eg. internal within the institution,<br/>Accreditation review by _____?<br/>Other _____?</p>  |   |             |      |              |  |  |                      |   |  |
| <p>8. Name of program coordinator or chair. If a program coordinator or chair has been appointed for the female section as well as the male section, include names of both.</p> <p>Chairman of Chemistry Department: Prof. Zaid Al-Othman<br/>Vice chairman for female section: Dr. Hessa Al-Talasi</p>   |   |             |      |              |  |  |                      |   |  |
| <p>9. Date of approval by the authorized body (MoHE for private institutions and Council of Higher Education for public institutions).</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 40%;">Campus Branch/Location</th> <th style="width: 30%;">Approval By</th> <th style="width: 30%;">Date</th> </tr> </thead> <tbody> <tr> <td>Main Campus:</td> <td></td> <td></td> </tr> <tr> <td>King Saud University</td> <td>Council of Higher Education /Ministry of Higher Education</td> <td></td> </tr> </tbody> </table> | Campus Branch/Location                                    | Approval By | Date | Main Campus: |  |  | King Saud University | Council of Higher Education /Ministry of Higher Education |  |
| Campus Branch/Location  | Approval By   | Date        |      |              |  |  |                      |   |  |
| Main Campus:  |   |             |      |              |  |  |                      |   |  |
| King Saud University  | Council of Higher Education /Ministry of Higher Education |             |      |              |  |  |                      |   |  |

## B. Program Context

1. Explain why the program was established.

a. Summarize economic reasons, social or cultural reasons, technological developments, national policy developments or other reasons.

- Development of Chemical industries in the Kingdom.
- Serving the petroleum, petrochemical, pharmaceutical, mining, food, detergents and other Chemical industries.
- Preparing highly qualified chemists for research and development laboratories.
- Preparing leaders for kingdom sustainable development.
- Safety awareness on health hazards and proper use of Chemicals and environmental protection.
- Supporting lifelong learning ensuring continued intellectual growth and welfare of society.

b. Explain the relevance of the program to the mission and goals of the institution.

- Providing other scientific disciplines with the basic knowledge needed for their professions; e.g. medical, engineering and agricultural students.
- Providing leaders for social development, professionalism, responsibility, and innovation in Chemistry based sectors.

|   |
|---|
| <p>2. Relationship (if any) to other programs offered by the institution/college/department.</p> <p>a. Does this program offer courses that students in other programs are required to take? <b>Yes</b> <input checked="" type="checkbox"/><br/><b>No</b> <input type="checkbox"/></p> <p>If yes, what has been done to make sure those courses meet the needs of students in the other programs?</p> <p>•Joint committees are formed to review the course requirements and learning outcomes.</p> <p>b. Does the program require students to take courses taught by other departments? <b>Yes</b> <input checked="" type="checkbox"/><br/><b>No</b> <input type="checkbox"/></p> <p>If yes, what has been done to make sure those courses in other departments meet the needs of students in this program?</p> <p>Required courses have been requested and Joint committees are formed from the concerned departments to review course outcomes.</p> |
| <p>3. Do students who are likely to be enrolled in the program have any special needs or characteristics? (ex. Part time evening students, physical and academic disabilities, limited IT or language skills).</p> <p><b>Yes</b> <input checked="" type="checkbox"/> <b>No</b> <input type="checkbox"/></p> <ul style="list-style-type: none"><li>• Adequate preparation and achievement in mathematics and sciences at the preparatory year.</li><li>• English language proficiency (from courses at the preparatory year).</li><li>• Knowledge of calculus and basic computer skills (from courses at the preparatory year).</li></ul>  |
| <p>4. What modifications or services are you providing for special needs applicants?</p>  |

### C. Mission, Goals and Objectives

#### 1. Program Mission Statement (insert)

To provide high quality education, research, and training with practical experience in Chemistry that is responsive to enhance the Kingdom's knowledge-based economy.

#### 2. List goals and objectives of the program within to help achieve the mission. For each goal and objective describe the major strategies to be followed and list the indicators that are used to measure achievement.

| 2. Goals  | 3. Objectives for each goal   | 4. Performance Indicators  | 5. Target Benchmarks   |
|---|---|--|--|
| <b>Goal 1:<br/>Achieving excellence in Chemistry education</b>                    | <b>Objective 1.1:</b><br>Design curriculum to ensure that graduates experience is closely aligned with anticipated future job requirements. | - The ability of students to compete in job market.                                      | 50% employed after one year from graduation or continue education. |
|   |   | - Number of lecture rooms equipped with smart board and internet access.                 | 100%   |
|   |   | - Number of electronic courses on LMS.   | 12 courses.  |
|   | <b>Objective 1.2:</b><br>Preparing students to have excellent basic knowledge of chemistry needed for research and teaching.                | - Percentage of faculty with internationally recognized degrees and research experience. | 100%   |
|   |   | - involvement of students in research  | 100% of graduate students.   |
| <b>Goal 2:<br/>To graduate chemistry students with advanced practical skills.</b> | <b>Objective 2.1:</b><br>Provide laboratory facilities with modern equipment needed for recent chemical processes.                          | Percentage of Labs. equipped with modern instruments.                                    | 100% of research Labs.<br>70% of teaching Labs.                    |
|   | <b>Objective 2.2:</b><br>Encourage upper level students to be engaged in research or projects   | - Number of students participating in research   | 100% of final year students.                                       |

|  |  |  |     |
|--|--|--|-----|
|  | to experience enhanced lab skills.   |  |     |
| <b>Goal 3:<br/>Promoting<br/>Chemistry culture<br/>in society.</b> | <b>Objective 3.1:</b><br>Participating in professional community and organization.     | - Number of students participating in chemistry clubs.           | 50% |
|  |  | - Number of publications of chemistry general magazine per year. | 15  |
|  | <b>Objective 3.2:</b><br>Providing the scientific community with high impact research. | - Number of publications in international journals.              | 400 |
|  |  | - Number of journals hosted by the department.                   | 2   |



## D. Program Structure and Organization

### 1. Program Description:

List the core and elective program courses offered each semester from Prep Year to graduation using the below Curriculum Study Plan Table (A separate table is required for each branch IF a given branch/location offers a different study plan).

A program or department manual should be available for students or other stakeholders and a copy of the information relating to this program should be attached to the program specification. This information should include required and elective courses, credit hour requirements and department/college and institution requirements, and details of courses to be taken in each year or semester.

The student must achieve (136) credit units as illustrated in the following frame of the study plan:

| Requirement                             | Number of Courses | Credit hours |
|---|-------------------|--------------|
| Preparatory year                        | 8                 | 31           |
| Remaining University Requirements       | 4                 | 8            |
| Internal specialized compulsory courses | 26                | 60           |
| Internal specialized elected courses    | 8                 | 16           |
| External required courses               | 2                 | 8            |
| External elected courses                | 6                 | 13           |
| <b>Total</b>                            | <b>54</b>         | <b>136</b>   |

### *Undergraduate Chemistry Degree Requirements:*

#### *Preparatory year: (31 Credit hours)*

| Course code | Course Title | Prerequisite | Credit hours |
|-------------|--------------|--------------|--------------|
| Lang 140    | English (1)  | None         | 8            |
| Lang 150    | English (2)  | None         | 8            |

|             |   |         |           |
|-------------|---|---------|-----------|
| MATH<br>140 | Mathematics (1) (Introduction)            | None    | 2         |
| MATH<br>150 | Mathematics (2) (Calculus & Integration)) | Mat 140 | 3         |
| TEC 140     | Computer skills                           | None    | 3         |
| NHG 140     | Research, thinking and learning skills    | None    | 3         |
| HEL 140     | Health & Fitness                          | None    | 1         |
| SCI 150     | Communication skills                      | None    | 2         |
| ENT 101     | Entrepreneurship                          | None    | 1         |
|             | <b>Total</b>                              |         | <b>31</b> |

***Remaining University Requirements: (8 Credit hours)***

| Course code | Course Title                      | Prerequisite | Credit hours |
|-------------|-----------------------------------|--------------|--------------|
| Islam 101   | Introduction to Islamic Culture   | None         | 2 (2+0)      |
| Islam 102   | Islam and Building up the Society | None         | 2 (2+0)      |
| Islam 103   | Economic System in Islam          | None         | 2 (2+0)      |
| Islam 104   | Fundamentals of Islamic Policies  | None         | 2 (2+0)      |
|             | <b>Total</b>                      |              | <b>8</b>     |

***Internal specialized compulsory courses: (60 Credit hours)***

| Course code | Course Title             | Prerequisite | Credit hours* |
|-------------|--------------------------|--------------|---------------|
| CHEM 101 ♦  | General Chemistry (1)    | None         | 4 (3+1+0)     |
| CHEM 107 ♦  | General Chemistry (2)    | None         | 3 (3+0+0)     |
| CHEM 222 ♦  | Chemistry of Main Groups | CHEM 107     | 3 (3+0+1)     |
| CHEM 231 ♦  | Chemical thermodynamic   | CHEM 107     | 2 (2+0+1)     |

|           |  |                        |           |
|-----------|--|------------------------|-----------|
| CHEM 240♦ | Organic Chemistry (1)                            | CHEM 107               | 2 (2+0+0) |
| CHEM 247♦ | Identification of Organic Compounds              | CHEM 107               | 2 (0+2+0) |
| CHEM 250♦ | Volumetric and Gravimetric Analysis              | CHEM 107               | 4 (3+1+1) |
| CHEM 321♦ | Chemistry of Transition Elements                 | CHEM 222               | 2 (2+0+1) |
| CHEM 322♦ | Quantum Chemistry (1)                            | CHEM 107 +<br>Math 111 | 2 (2+0+1) |
| CHEM 329  | Inorganic Compounds Spectroscopy                 | CHEM 321               | 2 (2+0+0) |
| CHEM 331  | Phases of Substances and Solutions               | CHEM 231               | 2 (2+0+1) |
| CHEM 332  | Chemical Kinetics                                | CHEM 231               | 2 (2+0+1) |
| CHEM 337  | Practical Physical Chemistry (1)                 | CHEM 231               | 2 (0+2+0) |
| CHEM 340  | Organic Chemistry (2)                            | CHEM 240               | 2 (2+0+0) |
| CHEM 341  | Heterocyclic Organic Chemistry                   | CHEM 340               | 2 (2+0+0) |
| CHEM 342  | Polymers and Petrochemicals                      | CHEM 340               | 2 (2+0+0) |
| CHEM 351  | Spectroscopic Analytical Methods                 | CHEM 250               | 2 (1+1+1) |
| CHEM 352  | Electro-analytical Methods                       | CHEM 250               | 2 (1+1+1) |
| CHEM 422  | Chemistry of Solid State                         | CHEM 321               | 3 (2+1+0) |
| CHEM 424  | Organometallic Chemistry                         | CHEM 321               | 2 (2+0+1) |
| CHEM 435  | Chemistry of Interfacial Surfaces                | CHEM 231               | 2 (2+0+0) |
| CHEM 438  | Practical Physical Chemistry (2)                 | CHEM 331               | 2 (0+2+0) |
| CHEM 441  | Organic Compounds Spectroscopy                   | CHEM 341               | 2 (2+0+0) |
| CHEM 451  | Chemical Separation &<br>Chromatographic Methods | CHEM 351               | 2 (1+1+1) |
| CHEM 497  | Training on instrumental analysis                |                        | 2(2+0+0)  |
| CHEM 499  | Research Project                                 |                        | 3 (0+3)   |
|           | <b>Total</b>                                     |                        | <b>60</b> |

\* Credit hours: (Theoretical + Practical + Tutorial)

♦ Courses conducted in English

**External compulsory courses**

|              |                      |          |          |
|--------------|----------------------|----------|----------|
| PHYS 102     | General Physics (2)  | None     | 4 (3+1)  |
| MATH 111     | Integration Calculus | MATH 150 | 4 (3+1)  |
| <b>Total</b> |                      |          | <b>8</b> |

**Elective courses from Department of Chemistry (To elect 8 courses of 16 Credit hours),**

| Course code | Course Title                                | Prerequisite | Credit hours | Level   |
|-------------|---|--------------|--------------|---------|
| CHEM 326    | Non-aqueous Chemistry                       | CHEM 321     | 1 (1+0+0)    | Sixth   |
| CHEM 327    | Lanthanides and Actinides                   | CHEM 321     | 1(1+0+0)     | Sixth   |
| CHEM 328    | Quantum Chemistry (2)                       | CHEM 322     | 2 (2+0+1)    | Eighth  |
| CHEM 330    | Physical Chemistry of Polymers              | CHEM 231     | 2 (1+1+0)    | Fifth   |
| CHEM 333    | Industrial Chemistry                        | CHEM 231     | 2 (2+0+0)    | Fifth   |
| CHEM 334    | Nuclear and Radiation Chemistry             | CHEM 101     | 2 (2+0+0)    | Fifth   |
| CHEM 338    | Theoretical Chemistry                       | CHEM 322     | 3 (2+1+1)    | Seventh |
| CHEM 343    | Organic Reaction Mechanism                  | CHEM 340     | 2 (2+0+1)    | Sixth   |
| CHEM 347    | Practical Applications of Organic Chemistry | CHEM 247     | 2 (0+2+0)    | Fifth   |
| CHEM 423    | Inorganic Reaction Mechanism                | CHEM 321     | 2 (2+0+1)    | Sixth   |
| CHEM 426    | Bio-inorganic Chemistry                     | CHEM 321     | 2 (2+0+1)    | Sixth   |
| CHEM 427    | Industrial-inorganic Chemistry              | CHEM 321     | 3 (2+1+1)    | Sixth   |
| CHEM 429    | Practical Inorganic Chemistry (2)           | CHEM 422     | 2 (0+2+0)    | Eighth  |
| CHEM 432    | Corrosion                                   | CHEM 331     | 2 (1+0+1)    | Seventh |
| CHEM 436    | Surface Chemistry and Catalysis             | CHEM 332     | 2 (2+0+0)    | Seventh |

|          |   |                           |           |         |
|----------|---|---------------------------|-----------|---------|
| CHEM 442 | Organic Industries                        | CHEM 341<br>+ CHEM<br>342 | 2 (1+0+0) | Seventh |
| CHEM 445 | Chemistry of Natural Products             | CHEM 341                  | 2 (2+0+1) | Seventh |
| CHEM 447 | Advanced Practical Organic<br>Chemistry   | CHEM 347                  | 2 (0+2+0) | Sixth   |
| CHEM 452 | Statistical Treatment of Chemical<br>Data | CHEM 351<br>+ CHEM<br>352 | 2 (1+1+0) | Seventh |
| CHEM 453 | Environmental Analysis                    | CHEM 351<br>+ CHEM<br>352 | 2 (1+1+0) | Seventh |
| CHEM 454 | Medical and Industrial Analysis           | CHEM 351<br>+ CHEM<br>352 | 2 (1+1+0) | Seventh |

\* Credit hours: (theoretical + practical + contact hours)

*Elective Courses from other departments (6units)*

| Course code | Course Title                              | Prerequisite | Credit<br>hours |
|-------------|---|--------------|-----------------|
| STAT 101    | Principles of Statics and Probability (1) | None         | 3 (2+1)         |
| ZOO 103     | Principles of General Zoology             | None         | 3 (2+1)         |
| BOT 102     | General Botany                            | None         | 3 (2+1)         |
| MIC 140     | Microbiology                              | None         | 3 (2+1)         |
| GEO 101     | Physical Geology                          | None         | 4 (3+1)         |
| BCH 211     | General Biochemistry (1)                  | None         | 3 (3+0)         |
|             | <b>Total</b>                              |              | <b>24</b>       |

*Serving courses for other departments:*

| Course code | Course Title | Credit<br>hours | Remarks |
|-------------|--------------|-----------------|---------|
|             |              |                 |         |

|           |                                       |         |                          |
|-----------|---------------------------------------|---------|--------------------------|
| CHEM 103♦ | General Chemistry (1)                 | 3 (3+0) | Non-specialized students |
| CHEM 145♦ | Organic Chemistry for Health Sciences | 2 (2+0) | Health science students  |
| CHEM 108  | Introduction to Organic Chemistry     | 4 (3+1) | Non-specialized students |
| CHEM 230♦ | Physical Chemistry                    | 3 (3+0) | Engineering students     |
| CHEM 244♦ | Organic Chemistry (1)                 | 2 (2+0) | Engineering students     |
| CHEM 245♦ | Organic Chemistry (2)                 | 2 (2+0) | Engineering students     |
| CHEM 247♦ | Identification of Organic Compounds   | 2 (0+2) | Engineering students     |
| CHEM 350♦ | Instrumental Analysis for Non-major   | 4 (2+2) | Engineering students     |
| CHEM 253  | Principles of Analytical Chemistry    | 2 (1+1) | Non-specialized students |
| CHEM 251  | Analytical Chemistry for Non-major    | 3 (2+1) | Non-specialized students |

♦ Courses conducted in English

*List of Required Courses in Chemistry at Different Levels*

| First Level  |  |          |           | Second Level |  |                     |           |
|--------------|--|----------|-----------|--------------|--|---------------------|-----------|
| Course       | Name                                     | Prereq.  | Units     | Course       | Name                                     | Prereq.             | Units     |
| ENG 140      | English (1)                              | None     | 8         | TEC 140      | Computer skills                          | None                | 3         |
| MATH 140     | Mathematics (1)                          | None     | 2         | MATH 150     | Mathematics (2)                          | MATH 140            | 3         |
| NHG 140      | Research, learning skills                | None     | 3         | ENG 150      | English (2)                              | ENG 140             | 8         |
| HEL 150      | Health & Fitness                         | None     | 1         | SCI 150      | Communication skills                     | None                | 2         |
|              |  |          |           | ENT 101      | Entrepreneurship                         | None                | 1         |
| <b>Total</b> |  |          | <b>14</b> | <b>Total</b> |  |                     | <b>17</b> |
| Third Level  |  |          |           | Fourth Level |  |                     |           |
| Course       | Name                                     | Prereq.  | Units     | Course       | Name                                     | Prereq.             | Units     |
| CHEM 101     | General Chemistry (1)                    | None     | 4 (3+1)   | CHEM 222     | CHEM. of Main Groups                     | CHEM 101            | 3 (3+0)   |
| CHEM 107     | General Chemistry (2)                    | None     | 3 (3+0)   | CHEM 231     | Chemical thermodynamics                  | CHEM 101            | 2 (2+0)   |
| MATH 111     | Integration Calculus                     | Math 150 | 4 (3+1)   | CHEM 240     | Organic Chemistry (1)                    | CHEM 101            | 2 (2+0)   |
| PHYS 102     | General Physics (2)                      | None     | 4 (3+1)   | CHEM 247     | Iden. of Org. Comp.                      | CHEM 107            | 2 (0+2)   |
|              | University requirement (Elective course) | None     | 2 (2+0)   | CHEM 250     | Vol. and Grav. Ana.                      | CHEM 107            | 4 (3+1)   |
|              |  |          |           |              | University requirement (Elective course) | None                | 2 (2+0)   |
|              |  |          |           |              | Elective Course                          |                     | 3         |
| <b>Total</b> |  |          | <b>17</b> | <b>Total</b> |  |                     | <b>18</b> |
| Fifth Level  |  |          |           | Sixth Level  |  |                     |           |
| Course       | Name                                     | Prereq.  | Units     | Course       | Name                                     | Prereq.             | Units     |
|              | University requirement                   | None     | 2 (2+0)   |              | University requirement                   | None                | 2 (2+0)   |
| CHEM 321     | CHEM. of Transition Elements             | CHEM 222 | 2 (2+0)   | CHEM 322     | Quantum Chemistry (1)                    | CHEM 107 + Math 111 | 2 (2+0)   |

|                      |                                    |          |           |                     |   |          |           |
|----------------------|------------------------------------|----------|-----------|---------------------|---|----------|-----------|
| CHEM 331             | Phases of Substances and Solutions | CHEM 231 | 2 (2+0)   | CHEM 328            | Inorganic Compounds Spectroscopy                | CHEM 321 | 2 (2+0)   |
| CHEM 337             | Practical Physical Chemistry (1)   | CHEM 231 | 2 (0+2)   | CHEM 332            | Chemical Kinetics                               | CHEM 231 | 2 (2+0)   |
| CHEM 340             | Organic Chemistry (2)              | CHEM 240 | 2 (2+0)   | CHEM 341            | Heterocyclic Organic Chemistry.                 | CHEM 340 | 2 (2+0)   |
| CHEM 351             | Spectroscopic Methods              | CHEM 250 | 2 (1+1)   | CHEM 342            | Polymers and Petrochemicals.                    | CHEM 340 | 2 (2+0)   |
|                      | CHEM. Elective Course              |          | 2         | CHEM 352            | Electo-analytical Methods                       | CHEM 250 | 2 (1+1)   |
|                      | CHEM. Elective Course              |          | 2         |                     | CHEM. Elective Course                           |          | 2         |
|                      | Free Elective Course               |          | 2         |                     | Free Elective Course                            |          | 2         |
| <b>Total</b>         |                                    |          | <b>18</b> | <b>Total</b>        |   |          | <b>18</b> |
| <b>Seventh Level</b> |                                    |          |           | <b>Eighth Level</b> |   |          |           |
| Course               | Name                               | Prereq.  | Units     | Course              | Name  | Prereq.  | Units     |
| CHEM 422             | Chemistry of Solid State           | CHEM 321 | 3 (2+1)   | CHEM 424            | Organometallic Chemistry                        | CHEM 321 | 2 (2+0)   |
| CHEM 435             | Chemistry of Interfacial Surfaces  | CHEM 231 | 2 (2+0)   | CHEM 451            | Chemical Separation and Chromatographic Methods | CHEM 351 | 2 (1+1)   |
| CHEM 438             | Practical Physical Chemistry (2)   | CHEM 331 | 2 (0+2)   | CHEM 499            | Research Project                                |          | 3 (0+3)   |
| CHEM 441             | Organic Compounds Spectroscopy     | CHEM 341 | 2 (2+0)   |                     | CHEM. Elective Course                           |          | 2         |
| CHEM 497             | Training on Chemical Instrument    | CHEM 351 | 2         |                     | CHEM. Elective Course                           |          | 2         |
|                      | CHEM. Elective Course              |          | 2         |                     | CHEM. Elective Course                           |          | 2         |
|                      | CHEM. Elective Course              |          | 2         |                     | Elective Course                                 |          | 3         |
|                      | Free Elective Course               |          | 2         |                     | Free Elective Course                            |          | 1         |
| <b>Total</b>         |                                    |          | <b>17</b> | <b>Total</b>        |   |          | <b>17</b> |



*List of Equivalent Courses between Old and New Plan*

| Old Plan            |               | New Plan |       |
|---------------------|---------------|----------|-------|
| CHEM 103 + CHEM 104 | (3+0) + (0+1) | CHEM 101 | (3+1) |
| CHEM 221            | (2+0)         | No       |       |
| No                  |               | CHEM 222 | (3+0) |
| No                  |               | CHEM 231 | (2+0) |
| CHEM 235            | (3+0)         | No       |       |
| CHEM 236            | (2+0)         | CHEM 334 | (2+0) |
| CHEM 244            | (2+0)         | CHEM 240 | (2+0) |
| CHEM 249            | (0+2)         | CHEM 247 | (0+2) |
| No                  |               | CHEM 250 | (3+1) |
| CHEM 254            | (1+1)         | No       |       |
| CHEM 255            | (2+0)         | No       |       |
| CHEM 259            | (0+2)         | No       |       |
| No                  |               | CHEM 321 | (2+0) |
| CHEM 323            | (3+0)         | No       |       |
| CHEM 220            | (2+0)         | CHEM 322 | (2+0) |
|                     |               | CHEM 326 | (1+0) |
|                     |               | CHEM 327 | (2+0) |
| CHEM 325            | (2+0)         | No       |       |
| CHEM 320            | (2+0)         | CHEM 328 | (2+0) |
| CHEM 420            | (2+0)         | CHEM 329 | (2+0) |
| CHEM 434            | (2+0)         | CHEM 330 | (2+0) |
| No                  |               | CHEM 331 | (2+0) |
| No                  |               | CHEM 332 | (2+0) |
| CHEM 335            | (3+0)         | No       |       |

| Old Plan            |               | New Plan            |               |
|---------------------|---------------|---------------------|---------------|
| CHEM 336            | (2+0)         | No                  |               |
| CHEM 239 + CHEM 339 | (0+0) + (0+1) | CHEM 337            | (0+2)         |
| CHEM 245            | (2+0)         | CHEM 340            | (2+0)         |
| CHEM 344            | (2+0)         | CHEM 341            | (2+0)         |
| CHEM 346            | (2+0)         | CHEM 342            | (2+0)         |
| CHEM 444            | (2+0)         | CHEM 343            | (2+0)         |
| CHEM 349            | (0+2)         | CHEM 347            | (0+2)         |
| CHEM 450 + CHEM 459 | (3+0) + (0+2) | CHEM 351 + CHEM 352 | (1+1) + (1+1) |
| CHEM 355            | (1+1)         | No                  |               |
| No                  |               | CHEM 422            | (2+1)         |
| CHEM 324            | (2+0)         | No                  |               |
| CHEM 425            | (2+0)         | CHEM 423            | (2+0)         |
| CHEM 421            | (2+0)         | CHEM 424            | (2+0)         |
| No                  |               | CHEM 426            | (2+0)         |
| No                  |               | CHEM 427            | (2+1)         |
| CHEM 428            | (0+2)         | CHEM 429            | (0+2)         |
| No                  |               | CHEM 432            | (1+1)         |
| CHEM 437            | (2+1)         | No                  |               |
| CHEM 433            | (2+0)         | CHEM 436            | (2+0)         |
| CHEM 439            | (0+2)         | CHEM 438            | (0+2)         |
| CHEM 440            | (2+0)         | CHEM 441            | (2+0)         |
| No                  |               | CHEM 442            | (1+1)         |
| CHEM 443            | (2+0)         | CHEM 445            | (2+0)         |
| CHEM 449            | (0+2)         | CHEM 447            | (0+2)         |

| Old Plan |       | New Plan |       |
|----------|-------|----------|-------|
| CHEM 354 | (1+1) | CHEM 451 | (1+1) |
| CHEM 456 | (1+1) | CHEM 452 | (1+1) |
| CHEM 457 | (1+1) | CHEM 453 | (1+1) |
| No       |       | CHEM 454 | (1+1) |
| No       |       | CHEM 497 | (0+2) |

Curriculum Study Plan Table

| Year                                  | Course Code | Course Title                             | Required or Elective | Pre-Requisite courses | Credit Hours* | College or Department  |
|---------------------------------------|-------------|--|----------------------|-----------------------|---------------|------------------------|
| <b>1<sup>st</sup> Year Semester 1</b> |             |  |                      |                       |               |                        |
|                                       | ENG 140     | English (1)                              | Required             | None                  | 8             | Preparatory year       |
|                                       | MATH 140    | Mathematics (1)                          | Required             | None                  | 2             | Preparatory year       |
|                                       | NHG 140     | Research, learning skills                | Required             | None                  | 3             | Preparatory year       |
|                                       | HEL 140     | Health & Fitness                         | Required             | None                  | 2             | Preparatory year       |
| <b>1<sup>st</sup> Year Semester 2</b> |             |  |                      |                       |               |                        |
|                                       | TEC 140     | Computer skills                          | Required             | None                  | 3             | Preparatory year       |
|                                       | MATH 150    | Mathematics (2)                          | Required             | None                  | 3             | Preparatory year       |
|                                       | ENG 150     | English (2)                              | Required             | None                  | 8             | Preparatory year       |
|                                       | SCI 150     | Communication skills                     | Required             | None                  | 2             | Preparatory year       |
| <b>2<sup>nd</sup> Year Semester 1</b> |             |  |                      |                       |               |                        |
|                                       |             | University requirement (Islamic courses) | Elective             | None                  | 2 (2+0)       |                        |
|                                       | CHEM 101    | General Chemistry (1)                    | Required             | None                  | 4 (3+1)       | Chemistry department   |
|                                       | CHEM 107    | General Chemistry (2)                    | Required             | None                  | 3 (3+0)       | Chemistry department   |
|                                       | MATH 111    | Integration Calculus                     | Required             | Math 150              | 4 (3+1)       | Mathematics Department |
|                                       | PHYS 102    | General Physics (2)                      | Required             | None                  | 4 (3+1)       | Physics Department     |
| <b>2<sup>nd</sup> Year</b>            |             |  |                      |                       |               |                        |

|   |          |  |          |          |         |                      |
|---|----------|--|----------|----------|---------|----------------------|
| <b>Semester<br/>2</b>                         |          |  |          |          |         |                      |
|   |          | University requirement (Islamic courses) | Elective | None     | 2 (2+0) |                      |
|   | CHEM 222 | Chemistry of Main Groups                 | Required | CHEM 107 | 3 (3+0) | Chemistry department |
|   | CHEM 231 | Chemical thermodynamics                  | Required | CHEM 107 | 2 (2+0) | Chemistry department |
|   | CHEM 240 | Organic Chemistry (1)                    | Required | CHEM 107 | 2 (2+0) | Chemistry department |
|   | CHEM 247 | Identification of Organic Compounds      | Required | CHEM 107 | 2 (0+2) | Chemistry department |
|   | CHEM 250 | Volumetric and Gravimetric Analysis      | Required | CHEM 107 | 4 (3+1) | Chemistry department |
|   |          | Elective Course                          | Elective | None     | 3       | College of Science   |
| <b>3<sup>rd</sup> Year<br/>Semester<br/>1</b> |          |  |          |          |         |                      |
|   |          | University requirement (Islamic courses) | Elective | None     | 2 (2+0) |                      |
|   | CHEM 321 | Chemistry of Transition Elements         | Required | CHEM 222 | 2 (2+0) | Chemistry department |
|   | CHEM 331 | Phases of Substances and Solutions       | Required | CHEM 231 | 2 (2+0) | Chemistry department |
|   | CHEM 337 | Practical Physical Chemistry (1)         | Required | CHEM 231 | 2 (0+2) | Chemistry department |
|   | CHEM 340 | Organic Chemistry (2)                    | Required | CHEM 240 | 2 (2+0) | Chemistry department |
|   | CHEM 351 | Spectroscopic Methods                    | Required | CHEM 250 | 2 (1+1) | Chemistry department |
|   | CHEM 330 | Physical Chemistry of Polymers           | Elective | CHEM 231 | 2       | Chemistry department |
|   | CHEM 333 | Industrial Chemistry                     | Elective | CHEM 231 | 2       | Chemistry department |

|                                       |          |   |          |                  |           |                      |
|---------------------------------------|----------|---|----------|------------------|-----------|----------------------|
|                                       | CHEM 334 | Nuclear and Radiation Chemistry             | Elective | CHEM 104         | 2         | Chemistry department |
|                                       | CHEM 347 | Practical Applications of Organic Chemistry | Elective | CHEM 247         | 2         | Chemistry department |
| <b>3<sup>rd</sup> Year Semester 2</b> |          |   |          |                  |           |                      |
|                                       |          | University requirement (Islamic courses)    | Elective | None             | 2 (2+0)   |                      |
|                                       | CHEM 322 | Quantum Chemistry(1)                        | Required | CHEM107+ Math111 | 2 (2+0)   | Chemistry department |
|                                       | CHEM 328 | Inorganic Compounds Spectroscopy            | Required | CHEM 321         | 2 (2+0)   | Chemistry department |
|                                       | CHEM 332 | Chemical Kinetics                           | Required | CHEM 231         | 2 (2+0)   | Chemistry department |
|                                       | CHEM 341 | Heterocyclic Organic Chemistry              | Required | CHEM 340         | 2 (2+0)   | Chemistry department |
|                                       | CHEM 342 | Polymers and Petrochemicals                 | Required | CHEM 340         | 2 (2+0)   | Chemistry department |
|                                       | CHEM 352 | Electroanalytical Methods                   | Required | CHEM 250         | 2 (2+0)   | Chemistry department |
|                                       |          | Free Elective Course                        | Elective | None             | 2         | Other colleges       |
|                                       | CHEM 326 | Non-aqueous Chemistry                       | Elective | CHEM 321         | 1 (1+0+0) | Chemistry department |
|                                       | CHEM 327 | Lanthanides and Actinides                   | Elective | CHEM 321         | 2 (2+0+0) | Chemistry department |
|                                       | CHEM 343 | Organic Reaction Mechanism                  | Elective | CHEM 340         | 2 (2+0+1) | Chemistry department |
|                                       | CHEM 423 | Inorganic Reaction Mechanism                | Elective | CHEM 321         | 2 (2+0+1) | Chemistry department |
|                                       | CHEM 426 | Bio-inorganic Chemistry                     | Elective | CHEM 321         | 2 (2+0+1) | Chemistry department |
|                                       | CHEM 427 | Industrial-inorganic Chemistry              | Elective | CHEM 321         | 3 (2+1+1) | Chemistry department |

|                                       |          |  |          |                        |              |                      |
|---------------------------------------|----------|--|----------|------------------------|--------------|----------------------|
|                                       | CHEM 447 | Advanced Practical Organic Chemistry   | Elective | CHEM 347               | 2<br>(0+2+0) | Chemistry department |
| <b>4<sup>th</sup> Year Semester 1</b> |          |  |          |                        |              |                      |
|                                       | CHEM 422 | Chemistry of Solid State               | Required | CHEM 321               | 3 (2+1)      | Chemistry department |
|                                       | CHEM 435 | Chemistry of Inter. Surf.              | Required | CHEM 231               | 2 (2+0)      | Chemistry department |
|                                       | CHEM 438 | Practical Phys. CHEM. (2)              | Required | CHEM 331               | 2 (0+2)      | Chemistry department |
|                                       | CHEM 441 | Organic Compounds Spectroscopy         | Required | CHEM 341               | 2 (2+0)      | Chemistry department |
|                                       |          | Free Elective Course                   | Elective | None                   | 2            | Other colleges       |
|                                       | CHEM 338 | Theoretical Chemistry                  | Elective | CHEM 322               | 2<br>(2+1+1) | Chemistry department |
|                                       | CHEM 432 | Corrosion                              | Elective | CHEM 331               | 2<br>(1+1+1) | Chemistry department |
|                                       | CHEM 436 | Surface Chemistry and Catalysis        | Elective | CHEM 332               | 2<br>(2+0+0) | Chemistry department |
|                                       | CHEM 442 | Organic Industries                     | Elective | CHEM 341 +<br>CHEM 342 | 2<br>(1+1+1) | Chemistry department |
|                                       | CHEM 445 | Chemistry of Natural Products          | Elective | CHEM 341               | 2<br>(2+0+1) | Chemistry department |
|                                       | CHEM 452 | Statistical Treatment of Chemical Data | Elective | CHEM351+<br>CHEM 352   | 2<br>(1+1+1) | Chemistry department |
|                                       | CHEM 453 | Environmental Analysis                 | Elective | CHEM 351 +<br>CHEM 352 | 2<br>(1+1+1) | Chemistry department |
|                                       | CHEM 454 | Medical and Industrial Analysis        | Elective | CHEM 351 +<br>CHEM 352 | 2<br>(1+1+1) | Chemistry department |
| <b>4<sup>th</sup> Year Semester 2</b> |          |  |          |                        |              |                      |
|                                       | CHEM 424 | Organometallic Chemistry               | Required | CHEM 321               | 2 (2+0)      | Chemistry department |

|  |          |   |          |          |              |                      |
|--|----------|---|----------|----------|--------------|----------------------|
|  | CHEM 451 | Chemical Separation and Chromatographic Methods | Required | CHEM 351 | 2 (1+1)      | Chemistry department |
|  | CHEM 499 | Research Project                                | Required | None     | 3 (0+3)      | Chemistry department |
|  | CHEM 329 | Quantum Chemistry (2)                           | Elective | CHEM 322 | 2<br>(2+0+1) | Chemistry department |
|  | CHEM 429 | Practical Inorganic Chemistry (2)               | Elective | CHEM 422 | 2<br>(0+2+0) | Chemistry department |
|  |          | Elective Course                                 | Elective | None     | 3            | College of Science   |
|  |          | Free Elective Course                            | Elective | None     | 1            | Other colleges       |

\* Credit hours: (Theoretical + Practical + Tutorial)

**2. Required Field Experience Component (if any, e.g. internship, cooperative program, work experience).**

|  |
|--|
| Summary of practical, clinical or internship component required in the program. Note: see Field Experience Specification |
| a. Brief description of field experience activity<br>NA  |
| b. At what stage or stages in the program does the field experience occur? (eg. year, semester)<br>NA                    |
| c. Time allocation and scheduling arrangement. (eg. 3 days per week for 4 weeks, full time for one semester)<br>NA       |
| d. Number of credit hours (if any)<br>NA   |

**3. Project or Research Requirements (if any)**

|   |
|---|
| Summary of any project or thesis requirements in the program. (Other than projects or assignments within individual courses) (A copy of the requirements for the project should be attached.) |
|---|



|  |
|--|
| a. Brief description   |
| <ul style="list-style-type: none"><li>Senior research projects: students practice different techniques and principles of Chemistry, submit a final project report with oral presentation.</li></ul>  |
| b. List the major intended learning outcomes of the project or research task.  |
| <ul style="list-style-type: none"><li>Use modern instrumentation and classical techniques to design experiments and to properly record and analyze the results</li></ul>   |
| c. At what stage or stages in the program is the project or research undertaken? (e.g. year, semester)   |
| During the final year.   |
| d. Number of credit hours (if any)   |
| 3 credit hours   |
| e. Description of academic advising and support mechanisms for students.   |
| <ul style="list-style-type: none"><li>Students work directly under supervision of a faculty member , individually or within a group.</li></ul>   |
| f. Description of assessment procedures (including mechanism for verification of standards)  |
| <ul style="list-style-type: none"><li>Submit a written report</li><li>Supervisor follow- up</li><li>Conduct an oral presentation</li><li>Oral exam committee of faculty members who reviewed the report and attended the presentation will decide the grade.</li></ul> |

#### 4. Learning Outcomes in Domains of Learning, Assessment Methods and Teaching Strategy

Program Learning Outcomes, Assessment Methods, and Teaching Strategy work together and are aligned. They are joined together as one, coherent, unity that collectively articulate a consistent agreement between student learning and teaching.

The *National Qualification Framework* provides five learning domains. Learning outcomes are required in the first four domains and sometimes are also required in the Psychomotor Domain.

On the table below are the five NQF Learning Domains, numbered in the left column. For Program Accreditation there are four learning outcomes required for knowledge and cognitive skills. The other three domains require at least two learning outcomes. Additional learning outcomes are suggested.

**First**, insert the suitable and measurable learning outcomes required in each of the learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and intended learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each program learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process.

|            | <b>NQF Learning Domains and Learning Outcomes</b>   | <b>Teaching Strategies</b>   | <b>Assessment Methods</b>   |
|------------|---|--|---|
| <b>1.0</b> | <b>Knowledge</b>  |  |   |
| 1.1        | To recognize the knowledge of fundamental concepts, principles, theories and methods of the various branches of Chemistry.  | <ul style="list-style-type: none"> <li>• Lectures.</li> <li>• Seminars.</li> <li>• Class work and discussions.</li> </ul>  | <ul style="list-style-type: none"> <li>• Short tests</li> <li>• Quizzes.</li> <li>• Homework.</li> <li>• Research.</li> <li>• Midterm exams.</li> <li>• Final exams.</li> </ul> |
| 1.2        | The ability to apply Chemical concepts to other areas of science, technology, and industry and appreciate the importance of Chemistry in these wider contexts.  |  |   |
| 1.3        | Define and retrieve scientific information about a Chemical topic or technique by efficient usage of modern library tools.  |  |   |
| <b>2.0</b> | <b>Cognitive Skills</b>   |  |   |
| 2.1        | To demonstrate logic, initiative, planning and decision making skills in solving problems encountered.  | <ul style="list-style-type: none"> <li>• Solving problems.</li> <li>• Dialogues and discussions.</li> <li>• Lectures</li> <li>• Looking in the internet.</li> <li>• Experimental work and its outcomes.</li> </ul> | <ul style="list-style-type: none"> <li>• Oral and written tests, seminars and discussions.</li> <li>• Homework.</li> <li>• Midterm exams.</li> <li>• Final exams.</li> </ul>    |
| 2.2        | To analyse, interpret and critically evaluate experimental data, make a quantitative evaluation of the errors inherent in the experimental measurements and draw valid conclusions from the results of experimental investigations. |  |   |
| 2.3        | To propose and apply creative solutions to Chemical problems.   |  |   |
| 2.4        | To integrate and evaluate information and data from a variety of sources in order to gain a coherent understanding of theory and practice.  |  |   |
|            |   |  |   |
| <b>3.0</b> | <b>Interpersonal Skills &amp; Responsibility</b>  |  |   |
| 3.1        | To give an oral account of experimental work performed and conclusions drawn from it  | <ul style="list-style-type: none"> <li>• Group assignments</li> <li>• Small group work.</li> <li>• Whole group discussion.</li> </ul>  | <ul style="list-style-type: none"> <li>• Lab. Exam</li> <li>• Oral exams</li> <li>• Midterm exams.</li> <li>• Final exams.</li> </ul>   |
| 3.2        | To apply team-working skills to address Chemistry problems and contribute significantly to the work of a group tackling such a problem, and work constructively with others.  |  |   |
| 3.3        | To prepare a detailed written report on experimental or project work performed in the accepted scientific format.   |  |   |
| 3.4        | To combine with colleagues to prepare and deliver a presentation and report of group work.  |  |   |
| 3.5        | To learn independently in familiar and unfamiliar situations with open-mindedness and in the spirit of critical enquiry.  |  |   |
|            |   |  |   |
| <b>4.0</b> | <b>Communication, Information Technology, Numerical</b>   |  |   |
| 4.1        | To communicate effectively in a variety of formats in order to present the results of research work   | <ul style="list-style-type: none"> <li>• By direct lecturing.</li> </ul>   | <ul style="list-style-type: none"> <li>• Practical exams.</li> </ul>  |

|            |  |   |  |
|------------|--|---|--|
| 4.2        | To communicate conclusions clearly to specialist and non-specialist audiences.                       | <ul style="list-style-type: none"> <li>• Computer labs.</li> <li>• PowerPoint.</li> </ul> | <ul style="list-style-type: none"> <li>• Written exams.</li> <li>• E – learning home work</li> </ul> |
| 4.3        | Apply developed generic and subject IT skills used in experimental data analysis and interpretation. |   |  |
| <b>5.0</b> | <b>Psychomotor</b>   |   |  |
| 5.1        | demonstrate appropriate safety techniques and proper use of lab equipment.                           | Perform lab. Experiments individually and in groups                                       | Practical exams.   |

### NQF Learning Outcome Verb, Assessment, and Teaching Strategies and Suggestions

| NQF Learning Domains                                    | Suggested Verbs  |
|---|--|
| <b>Knowledge</b>  | list, name, record, define, label, outline, state, describe, recall, memorize, reproduce, recognize, record, tell, write   |
| <b>Cognitive Skills</b>                                 | estimate, explain, summarize, write, compare, contrast, diagram, subdivide, differentiate, criticize, calculate, analyze, compose, develop, create, prepare, reconstruct, reorganize, summarize, explain, predict, justify, rate, evaluate, plan, design, measure, judge, justify, interpret, appraise |
| <b>Interpersonal Skills &amp; Responsibility</b>        | demonstrate, judge, choose, illustrate, modify, show, use, appraise, evaluate, justify, analyze, question, and write   |
| <b>Communication, Information Technology, Numerical</b> | demonstrate, calculate, illustrate, interpret, research, question, operate, appraise, evaluate, assess, and criticize  |
| <b>Psychomotor</b>                                      | demonstrate, show, illustrate, perform, dramatize, employ, manipulate, operate, prepare, produce, draw, diagram, examine, construct, assemble, experiment, and reconstruct   |

Suggested ***verbs not to use*** when writing measurable and assessable learning outcomes are as follows:

Consider            Maximize            Continue            Review            Ensure            Enlarge            Understand  
Maintain            Reflect            Examine            Strengthen            Explore            Encourage            Deepen

Some of these verbs can be used if tied to specific actions or quantification.

#### Suggested assessment methods and teaching strategies are:

According to research and best practices, multiple and continuous assessment methods are required to verify student learning. Current trends incorporate a wide range of rubric assessment tools; including web-based student performance systems that apply rubrics, benchmarks, KPIs, and analysis. Rubrics are especially helpful for qualitative evaluation. Differentiated assessment strategies include: exams, portfolios, long and short essays, log books, analytical reports, individual and group presentations, posters, journals, case studies, lab manuals, video analysis, group reports, lab reports, debates, speeches, learning logs, peer evaluations, self-evaluations, videos, graphs, dramatic performances, tables, demonstrations, graphic organizers, discussion forums, interviews, learning contracts, antidotal notes, artwork, KWL charts, and concept mapping.

Differentiated teaching strategies should be selected to align with the curriculum taught, the needs of students, and the intended learning outcomes. Teaching methods include: lecture, debate, small group work, whole group and small group discussion, research activities, lab demonstrations, projects, debates, role playing, case studies, guest speakers, memorization, humor, individual presentation, brainstorming, and a wide variety of hands-on student learning activities.

### Program Learning Outcome Mapping Matrix

Identify on the table below the courses that are required to teach the program learning outcomes. Insert the program learning outcomes, according to the level of instruction, from the above table below and indicate the courses and levels that are required to teach each one; use your program's course numbers across the top and the following level scale. Levels: I = Introduction P = Proficient A = Advanced

#### Required Courses (26):

|            | Course Offerings  | Course Offerings |          |          |          |          |          |          |          |          |          |          |          |          |
|------------|---|------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
|            |   | CHEM 101         | CHEM 107 | CHEM 222 | CHEM 231 | CHEM 240 | CHEM 247 | CHEM 250 | CHEM 321 | CHEM 322 | CHEM 329 | CHEM 331 | CHEM 332 | CHEM 337 |
| <b>1.0</b> | <b>Knowledge</b>  |                  |          |          |          |          |          |          |          |          |          |          |          |          |
| 1.1        | To recognize the knowledge of fundamental concepts, principles, theories and methods of the various branches of Chemistry.  | I                | I        | I        | I        | I        | I        | I        | A        | I        | A        | P        | P        | P        |
| 1.2        | The ability to apply Chemical concepts to other areas of science, technology, and industry and appreciate the importance of Chemistry in these wider contexts.  | ---              | ---      | P        | I        | ---      | I        | I        | P        | P        | P        | P        | P        | I        |
| 1.3        | Define and retrieve scientific information about a Chemical topic or technique by efficient usage of modern library tools.  | I                | I        | I        | P        | I        | I        | I        | A        | I        | A        | P        | P        | I        |
| <b>2.0</b> | <b>Cognitive Skills</b>   |                  |          |          |          |          |          |          |          |          |          |          |          |          |
| 2.1        | To demonstrate logic, initiative, planning and decision making skills in solving problems encountered.  | I                | ---      | P        | I        | ---      | P        | I        | P        | P        | P        | ---      | P        | P        |
| 2.2        | To analyse, interpret and critically evaluate experimental data, make a quantitative evaluation of the errors inherent in the experimental measurements and draw valid conclusions from the results of experimental investigations. | ---              | ---      | P        | ---      | ---      | P        | I        | P        | P        | P        | I        | A        | P        |
| 2.3        | To propose and apply creative solutions to Chemical problems.   | I                | I        | P        | I        | I        | ---      | I        | P        | P        | P        | I        | P        | ---      |
| 2.4        | To integrate and evaluate information and data from a variety of sources in order to  | I                | I        | P        | P        | ---      | P        | I        | P        | P        | P        | I        | P        | P        |

|            |  |     |     |     |     |     |     |   |     |     |     |     |     |   |
|------------|--|-----|-----|-----|-----|-----|-----|---|-----|-----|-----|-----|-----|---|
|            | gain a coherent understanding of theory and practice.  |     |     |     |     |     |     |   |     |     |     |     |     |   |
| <b>3.0</b> | <b>Interpersonal Skills &amp; Responsibility</b>   |     |     |     |     |     |     |   |     |     |     |     |     |   |
| 3.1        | To give an oral account of experimental work performed and conclusions drawn from it   | I   | I   | P   | --- | --- | P   | I | P   | P   | P   | I   | P   | P |
| 3.2        | To apply team-working skills to address Chemistry problems and contribute significantly to the work of a group tackling such a problem, and work constructively with others. | --- | --- | P   | I   | I   | P   | I | P   | P   | P   | I   | P   | P |
| 3.3        | To prepare a detailed written report on experimental or project work performed in the accepted scientific format.  | --- | --- | P   | --- | --- | P   | I | P   | P   | P   | --- | P   | P |
| 3.4        | To combine with colleagues to prepare and deliver a presentation and report of group work.   | I   | I   | P   | P   | --- | --- | I | P   | P   | P   | P   | P   | P |
| 3.5        | To learn independently in familiar and unfamiliar situations with open-mindedness and in the spirit of critical enquiry.   | I   | I   | P   | I   | I   | --- | I | P   | P   | P   | I   | P   | P |
| <b>4.0</b> | <b>Communication, Information Technology, Numerical</b>  |     |     |     |     |     |     |   |     |     |     |     |     |   |
| 4.1        | To communicate effectively in a variety of formats in order to present the results of research work  | I   | --- | --- | P   | I   | I   | I | P   | P   | P   | P   | P   | P |
| 4.2        | To communicate conclusions clearly to specialist and non-specialist audiences.   | I   | I   | --- | I   | I   | --- | I | P   | P   | P   | P   | P   | P |
| 4.3        | Apply developed generic and subject IT skills used in experimental data analysis and interpretation.   | I   | --- | --- | I   | --- | --- | I | P   | P   | P   | I   | P   | P |
| <b>5.0</b> | <b>Psychomotor</b>   |     |     |     |     |     |     |   |     |     |     |     |     |   |
| 5.1        | demonstrate appropriate safety techniques and proper use of lab equipment.   | I   | --- | --- | --- | --- | I   | I | --- | --- | --- | --- | --- | P |

**Required Courses (continued):**

|  | Course Offerings<br><br>NQF Learning Domains<br>and Learning Outcomes   | CHEM 340             | CHEM 341 | CHEM 342 | CHEM 351 | CHEM 352 | CHEM 422 | CHEM 424 | CHEM 435 | CHEM 438 | CHEM 441 | CHEM 451 | CHEM 497 | CHEM 499 |
|--|---|----------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
|  |   | <b>1.0 Knowledge</b> |          |          |          |          |          |          |          |          |          |          |          |          |
| 1.1  | To recognize the knowledge of fundamental concepts, principles, theories and methods of the various branches of Chemistry.  | P                    | P        | P        | P        | P        | A        | I        | I        | I        | A        | A        | A        | A        |
| 1.2  | The ability to apply Chemical concepts to other areas of science, technology, and industry and appreciate the importance of Chemistry in these wider contexts.  | I                    | P        | I        | P        | P        | P        | P        | I        | ---      | A        | ---      | ---      | A        |
| 1.3  | Define and retrieve scientific information about a Chemical topic or technique by efficient usage of modern library tools.  | P                    | P        | P        | P        | P        | A        | A        | I        | P        | ---      | A        | A        | A        |
| <b>2.0 Cognitive Skills</b>                          |   |                      |          |          |          |          |          |          |          |          |          |          |          |          |
| 2.1  | To demonstrate logic, initiative, planning and decision making skills in solving problems encountered.  | ---                  | ---      | I        | P        | P        | P        | P        | I        | P        | P        | A        | A        | A        |
| 2.2  | To analyse, interpret and critically evaluate experimental data, make a quantitative evaluation of the errors inherent in the experimental measurements and draw valid conclusions from the results of experimental investigations. | P                    | I        | I        | P        | P        | P        | P        | P        | P        | A        | A        | A        | A        |
| 2.3  | To propose and apply creative solutions to Chemical problems.   | P                    | P        | ---      | P        | P        | P        | P        | I        | I        | A        | A        | A        | A        |
| 2.4  | To integrate and evaluate information and data from a variety of sources in order to gain a coherent understanding of theory and practice.  | ---                  | P        | I        | P        | P        | P        | P        | P        | I        | A        | ---      | ---      | A        |
| <b>3.0 Interpersonal Skills &amp; Responsibility</b> |   |                      |          |          |          |          |          |          |          |          |          |          |          |          |
| 3.1  | To give an oral account of experimental work performed and conclusions drawn from it  | ---                  | ---      | ---      | P        | P        | P        | P        | I        | ---      | ---      | A        | A        | A        |



|            |  |     |     |     |   |   |     |     |     |   |     |     |     |     |   |
|------------|--|-----|-----|-----|---|---|-----|-----|-----|---|-----|-----|-----|-----|---|
| 3.2        | To apply team-working skills to address Chemistry problems and contribute significantly to the work of a group tackling such a problem, and work constructively with others. | P   | P   | P   | P | P | P   | P   | P   | I | P   | A   | A   | A   | A |
| 3.3        | To prepare a detailed written report on experimental or project work performed in the accepted scientific format.  | --- | P   | I   | P | P | P   | P   | --- | P | A   | A   | A   | A   | A |
| 3.4        | To combine with colleagues to prepare and deliver a presentation and report of group work.   | I   | I   | --- | P | P | P   | P   | P   | I | A   | A   | A   | A   | A |
| 3.5        | To learn independently in familiar and unfamiliar situations with open-mindedness and in the spirit of critical enquiry.   | P   | P   | --- | P | P | P   | P   | I   | I | A   | A   | A   | A   | A |
| <b>4.0</b> | <b>Communication, Information Technology, Numerical</b>  |     |     |     |   |   |     |     |     |   |     |     |     |     |   |
| 4.1        | To communicate effectively in a variety of formats in order to present the results of research work  | I   | P   | I   | P | P | P   | P   | I   | P | A   | A   | A   | A   | A |
| 4.2        | To communicate conclusions clearly to specialist and non-specialist audiences.   | --- | P   | I   | P | P | P   | P   | I   | P | A   | --- | --- | --- | A |
| 4.3        | Apply developed generic and subject IT skills used in experimental data analysis and interpretation.   | --- | --- | I   | P | P | P   | P   | I   | P | --- | A   | A   | A   | A |
| <b>5.0</b> | <b>Psychomotor</b>   |     |     |     |   |   |     |     |     |   |     |     |     |     |   |
| 5.1        | demonstrate appropriate safety techniques and proper use of lab equipment.   | I   | I   | I   | P | P | --- | --- | --- | P | --- | A   | A   | A   | A |

**Elective courses (21):**

|  | Course Offerings<br><br>NQF Learning Domains<br>and Learning Outcomes   | CHEM 326             | CHEM 327 | CHEM 328 | CHEM 330 | CHEM 333 | CHEM 334 | CHEM 338 | CHEM 343 | CHEM 347 | CHEM 423 | CHEM 426 | CHEM 427 | CHEM 429 |
|--|---|----------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
|  |   | <b>1.0 Knowledge</b> |          |          |          |          |          |          |          |          |          |          |          |          |
| 1.1  | To recognize the knowledge of fundamental concepts, principles, theories and methods of the various branches of Chemistry.  | I                    | A        | A        | I        | P        | I        | A        | P        | P        | A        | A        | A        | A        |
| 1.2  | The ability to apply Chemical concepts to other areas of science, technology, and industry and appreciate the importance of Chemistry in these wider contexts.  | P                    | P        | P        | P        | A        | I        | A        | P        | P        | A        | A        | A        | A        |
| 1.3  | Define and retrieve scientific information about a Chemical topic or technique by efficient usage of modern library tools.  | P                    | P        | P        | A        | A        | I        | A        | P        | ---      | P        | P        | P        | P        |
| <b>2.0 Cognitive Skills</b>                          |   |                      |          |          |          |          |          |          |          |          |          |          |          |          |
| 2.1  | To demonstrate logic, initiative, planning and decision making skills in solving problems encountered.  | P                    | P        | P        | P        | P        | I        | P        | P        | P        | P        | P        | P        | P        |
| 2.2  | To analyse, interpret and critically evaluate experimental data, make a quantitative evaluation of the errors inherent in the experimental measurements and draw valid conclusions from the results of experimental investigations. | P                    | P        | ---      | I        | P        | I        | A        | I        | P        | P        | P        | P        | P        |
| 2.3  | To propose and apply creative solutions to Chemical problems.   | P                    | P        | P        | I        | P        | I        | A        | I        | P        | P        | P        | P        | P        |
| 2.4  | To integrate and evaluate information and data from a variety of sources in order to gain a coherent understanding of theory and practice.  | P                    | P        | P        | P        | P        | I        | A        | I        | P        | P        | P        | P        | P        |
| <b>3.0 Interpersonal Skills &amp; Responsibility</b> |   |                      |          |          |          |          |          |          |          |          |          |          |          |          |
| 3.1  | To give an oral account of experimental work performed and conclusions drawn from it  | P                    | P        | ---      | I        | P        | I        | A        | ---      | ---      | P        | P        | P        | P        |
| 3.2  | To apply team-working skills to address Chemistry problems and contribute significantly to the work of a group tackling   | P                    | P        | P        | P        | I        | I        | P        | ---      | P        | P        | P        | P        | P        |

|            |  |     |     |     |     |     |     |     |     |     |   |     |     |     |
|------------|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|-----|-----|-----|
|            | such a problem, and work constructively with others.   |     |     |     |     |     |     |     |     |     |   |     |     |     |
| 3.3        | To prepare a detailed written report on experimental or project work performed in the accepted scientific format.        | P   | P   | --- | P   | P   | I   | A   | I   | P   | P | P   | P   | P   |
| 3.4        | To combine with colleagues to prepare and deliver a presentation and report of group work.                               | P   | P   | P   | I   | I   | --- | P   | I   | P   | P | P   | P   | P   |
| 3.5        | To learn independently in familiar and unfamiliar situations with open-mindedness and in the spirit of critical enquiry. | P   | P   | P   | P   | A   | I   | A   | I   | --- | P | P   | P   | P   |
| <b>4.0</b> | <b>Communication, Information Technology, Numerical</b>  |     |     |     |     |     |     |     |     |     |   |     |     |     |
| 4.1        | To communicate effectively in a variety of formats in order to present the results of research work                      | P   | P   | P   | I   | --- | --- | A   | I   | P   | P | P   | P   | P   |
| 4.2        | To communicate conclusions clearly to specialist and non-specialist audiences.   | P   | P   | P   | P   | P   | I   | A   | --- | --- | P | P   | P   | P   |
| 4.3        | Apply developed generic and subject IT skills used in experimental data analysis and interpretation.                     | P   | P   | P   | --- | P   | --- | A   | --- | P   | P | P   | P   | P   |
| <b>5.0</b> | <b>Psychomotor</b>   |     |     |     |     |     |     |     |     |     |   |     |     |     |
| 5.1        | demonstrate appropriate safety techniques and proper use of lab equipment.   | --- | --- | --- | P   | --- | I   | --- | I   | P   | P | --- | --- | --- |

**Elective courses (continued):**

| Course Offerings                           |   | CHEM 432 | CHEM 436 | CHEM 442 | CHEM 445 | CHEM 447 | CHEM 452 | CHEM 453 | CHEM 454 |
|--|---|----------|----------|----------|----------|----------|----------|----------|----------|
| NQF Learning Domains and Learning Outcomes |   |          |          |          |          |          |          |          |          |
| <b>1.0</b>                                 | <b>Knowledge</b>  |          |          |          |          |          |          |          |          |
| 1.1  | To recognize the knowledge of fundamental concepts, principles, theories and methods of the various branches of Chemistry.  | P        | I        | A        | A        | P        | A        | A        | A        |
| 1.2  | The ability to apply Chemical concepts to other areas of science, technology, and industry and appreciate the importance of Chemistry in these wider contexts.  | P        | A        | A        | P        | A        | A        | A        | A        |
| 1.3  | Define and retrieve scientific information about a Chemical topic or technique by efficient usage of modern library tools.  | P        | P        | ---      | ---      | A        | A        | A        | A        |
| <b>2.0</b>                                 | <b>Cognitive Skills</b>   |          |          |          |          |          |          |          |          |
| 2.1  | To demonstrate logic, initiative, planning and decision making skills in solving problems encountered.  | P        | ---      | A        | P        | A        | A        | A        | A        |
| 2.2  | To analyse, interpret and critically evaluate experimental data, make a quantitative evaluation of the errors inherent in the experimental measurements and draw valid conclusions from the results of experimental investigations. | P        | ---      | A        | P        | A        | A        | A        | A        |
| 2.3  | To propose and apply creative solutions to Chemical problems.   | P        | P        | A        | A        | A        | A        | A        | A        |
| 2.4  | To integrate and evaluate information and data from a variety of sources in order to gain a coherent understanding of theory and practice.  | P        | A        | A        | P        | A        | A        | A        | A        |
| <b>3.0</b>                                 | <b>Interpersonal Skills &amp; Responsibility</b>  |          |          |          |          |          |          |          |          |
| 3.1  | To give an oral account of experimental work performed and conclusions drawn from it  | P        | ---      | P        | P        | A        | A        | A        | A        |
| 3.2  | To apply team-working skills to address Chemistry problems and contribute significantly to the work of a group tackling   | P        | A        | A        | P        | A        | A        | A        | A        |

|            |  |   |     |     |     |   |   |   |   |
|------------|--|---|-----|-----|-----|---|---|---|---|
|            | such a problem, and work constructively with others.   |   |     |     |     |   |   |   |   |
| 3.3        | To prepare a detailed written report on experimental or project work performed in the accepted scientific format.        | P | P   | A   | P   | A | A | A | A |
| 3.4        | To combine with colleagues to prepare and deliver a presentation and report of group work.                               | P | A   | --- | --- | A | A | A | A |
| 3.5        | To learn independently in familiar and unfamiliar situations with open-mindedness and in the spirit of critical enquiry. | P | P   | A   | P   | A | A | A | A |
| <b>4.0</b> | <b>Communication, Information Technology, Numerical</b>  |   |     |     |     |   |   |   |   |
| 4.1        | To communicate effectively in a variety of formats in order to present the results of research work                      | P | P   | P   | P   | A | A | A | A |
| 4.2        | To communicate conclusions clearly to specialist and non-specialist audiences.   | P | P   | P   | P   | A | A | A | A |
| 4.3        | Apply developed generic and subject IT skills used in experimental data analysis and interpretation.                     | I | I   | A   | P   | A | A | A | A |
| <b>5.0</b> | <b>Psychomotor</b>   |   |     |     |     |   |   |   |   |
| 5.1        | demonstrate appropriate safety techniques and proper use of lab equipment.   | P | --- | A   | P   | A | A | A | A |

## 5. Admission Requirements for the program

Attach handbook or bulletin description of admission requirements including any course or experience prerequisites.

## 6. Attendance and Completion Requirements

Attach handbook or bulletin description of requirements for:

- Attendance.
- Progression from year to year.
- Program completion or graduation requirements.

## E. Regulations for Student Assessment and Verification of Standards

What processes will be used for verifying standards of achievement (eg check marking of sample of tests or assignments? Independent assessment by faculty from another institution) (Processes may vary for different courses or domains of learning.)

- Samples of all kind of assessments are available in the departmental course portfolio of each course.
- Group marking and group grading is conducted in some courses where the exam paper of each person is graded by more than one instructor.
- Conducting employers' surveys.

## F. Student Administration and Support

### 1. Student Academic Counselling

Describe the arrangements for academic counselling and advising for students, including both scheduling of faculty office hours and advising on program planning, subject selection and career planning (which might be available at college level).

- Experienced faculty members are assigned as advisors to help students understand the program requirements and registration process.
- Students also get some guidance and advice through the university website
- Each faculty member posts office hours on his/her door for students' guidance.

- Career days are conducted where faculty, administrators and employers are invited to advise students.

## 2. Student Appeals

Attach the regulations for student appeals on academic matters, including processes for consideration of those appeals.

\*Grade appeals: Students complete a grade appeal form along with a binder of supporting evidence and submit them by the end of the second day of the new term. The chair of the department records the results and distributes them to the necessary parties.

## G. Learning Resources, Facilities and Equipment

1a. What processes are followed by faculty and teaching staff for planning and acquisition of textbooks, reference and other resource material including electronic and web based resources?

- Assigning textbooks through a textbook committee after reviewing the appropriateness of the material by concerned faculty and approval in the departmental and higher academic councils
- Writing laboratory manuals and some other textbooks by faculty and reviewing them proficiently before approval
- Posting courses on the web.

1b. What processes are followed by faculty and teaching staff for planning and acquisition resources for library, laboratories, and classrooms.

- Faculty members ensure that the library subscribes to the necessary data bases that give students access to the journals that they need.
- Requests for purchases of new materials that should be included in the library's holdings are made.
- Laboratories materials, glassware, and equipment are requested from college stores or university central stores through a form signed by department chairman. If the required

materials or equipment are not available, the request is submitted to the university purchase department.

2. What processes are followed by faculty and teaching staff for evaluating the adequacy of textbooks, reference and other resource provisions?

- The periodic revision of text books for courses.
- Instructors suggest textbooks appropriate to their courses through the department appointed course coordinator who submits their request to a curriculum committee which can recommend the books.

3. What processes are followed by students for evaluating the adequacy of textbooks, reference and other resource provisions?

Library resources adequacy satisfaction questionnaires for students.

4. What processes are followed for textbook acquisition and approval?

Committees are formed to inspect the current textbook and compare it to the most recent textbooks in the field. The new book selected will be approved by the departmental and higher academic councils in the university.

## H. Faculty and other Teaching Staff

### 1. Appointments

Summarize the process of employment of new faculty and teaching staff to ensure that they are appropriately qualified and experienced for their teaching responsibilities.

- All Faculty members have Ph.D. and teaching experience.
- Distinguished graduates are employed as instructors in the department then they are given scholarships for M.Sc. and Ph.D. degrees. After that they are employed as faculty members after verification of their credentials



- Academic vacancies are advertised nationally and internationally through all kinds of media (websites and newspapers) include announcement of positions through the Saudi Cultural Attaché in different countries. Then applicants are appointed based on academic qualification and experience.
- Academic committee inspects the resumes of the applicants and checks on their experience in teaching.
- CVs are reviewed and applicants are evaluated based on credentials and experience. Applicants of interest are then interviewed. Referees of applicants under consideration are then contacted. Publications by the applicant are examined.
- Presentations on the topics of interest are made in the department and evaluated by the departmental council.

## 2. Participation in Program Planning, Monitoring and Review

a. Explain the process for consultation with and involvement of teaching staff in monitoring program quality, annual review and planning for improvement.

All faculty will participate in the design and implementation of a programmatic assessment plan and self-study process that is continuous and involves the review of the program's:

- 1.mission statement, goals, and student learning outcomes;
  - 2.procedures and plans for how to best meet goals and accomplish student learning outcomes;
  - 3.processes for determining if the mission, goals, and student learning outcomes are being met;
- and
- 4.changes to the above based on the findings of self-study process.

The review of an academic program must include the assessment of student learning to determine the degree to which students are obtaining the knowledge, skills, and competencies expected of graduates of the program and the institution.

- Current programs are reviewed every five years within the divisions of the department by individual faculty members and the group as a whole.
- A departmental committee is formed to look into the recommendations of various divisions and to make a final proposal.
- The revised program is discussed in the departmental council before approval.

b. Explain the process of the Advisory Committee (if applicable)

### 3. Professional; Development

What arrangements are made for professional development of faculty and teaching staff for:

- a. Improvement of skills in teaching and student assessment?

All new faculty members will be appointed a peer-mentor by the Department Chair upon hire. Peer mentors are experienced and successful faculty members who will advise and counsel new faculty members regarding teaching and other faculty responsibilities. New faculty members will meet with their peer-mentor on a regular and as-needed basis.

The university established a teaching resource office. The mission of the teaching resource office will be to support faculty who are interested in;

- enhancing student academic success and engagement
- workshops, discussion groups, and other activities focused on teaching and learning
- consultations regarding teaching, learning, and the effective use of instructional technologies
- course assessment and redesign
- grants for instructional improvement
- materials, software, facilities, instructional and technical expertise
- Peer consultation in teaching is conducted over the academic year for the faculty upon their own request.

b. Other professional development including knowledge of research and developments in their field of teaching specialty?

- Workshops run by international experts are conducted frequently throughout the academic year on emerging teaching and learning strategies.
- Sponsoring grants for research and innovation in teaching and learning are offered.
- Faculty members attend conferences, workshops and sabbatical leaves to enhance their knowledge of research in their fields.
- Faculty members have the chance to attend seminars and conference locally and abroad.

#### 4. Preparation of New Faculty and Teaching Staff

Describe the process used for orientation and induction of new, visiting or part time teaching staff to ensure full understanding of the program and the role of the course(s) they teach as components within it.

- The orientation includes exposing new faculty to the university and department rules and regulations handbooks to understand the mission and philosophy of the university, department and program and to become familiar with policies and procedures.
- A trained mentor usually helps the new faculty member.
- Senior faculty members help and guide the new faculty.

#### 5. Part Time and Visiting Faculty and Teaching Staff

Provide a summary of Program/Department/College/institution policy on appointment of part time and visiting teaching staff. (i.e. Approvals required, selection process, proportion to total teaching staff, etc.)

- Applications for part time faculty are reviewed by a committee of the concerned program and the final decision is approved by the higher university administrators.
- The number is limited to only one or two courses per academic year.

## I. Program Evaluation and Improvement Processes

### 1. Effectiveness of Teaching

a. What processes are used to evaluate and improve the strategies for developing learning outcomes in the different domains of learning? (eg. assessment of learning achieved, advice on consistency with learning theory for different types of learning, assessment of understanding and skill of teaching staff in using different strategies)

The achievement of learning outcomes in each of the different domains of learning will be assessed by the program assessment committee on an on-going basis using student performance data collected in the course. Based on findings of the assessment committee adjustments to the learning strategies in each domain of learning will be made.

- Faculty should be required to take a test to learn their preferred learning style(s) which should increase awareness of their biases in learning and teaching.
- Training in different learning styles should be conducted along with teaching strategies to address a variety of learning styles.
- Strategies on how to effectively teach a variety of learning styles should be outlined by the faculty member in her/his set of goals and objectives at the beginning of the academic year and then reviewed at the end of the year during the performance evaluation.

b. What processes are used for evaluating the skills of faculty and teaching staff in using the planned strategies?

A standardized course evaluation form will be completed by students in each course that will evaluate the teaching skills of the course instructor in using the planned strategies for learning in each of the learning domains. As part of the faculty performance review process peer-evaluators will assess teaching skills by conducting a complete and thorough review of teaching effectiveness including classroom observations, review of course materials, review of instructor's teaching dossier, and student evaluations. End-of-year performance evaluations reviewed by the department chairperson.

## 2. Overall Program Evaluation

a. What strategies are used in the program for obtaining assessments of the overall quality of the program and achievement of its intended learning outcomes:

1. Assessment will include

- a) formative and summative assessments
- b) direct and indirect assessments
- c) qualitative and quantitative assessments
- d) benchmarking

2. All program goals, objectives, and learning outcomes will be mapped to specific courses

3. Specific course objectives, goals, and learning outcomes will be clearly communicated on the course syllabus

4. Multiple means (at least two) will be used to determine the achievement of learning outcomes

(i) From current students and graduates of the program?

Course Level:

1. Examinations and quizzes
2. Observations of field work, internship performance, service learning
3. Capstone projects, senior theses, exhibits, or performance
4. Pass rates or scores on licensure, certification, or subject area tests
5. Student perception surveys

(ii) From independent advisors and/or evaluator (s)?

1. Surveys
2. Interviews
3. Program Advisory Committees

|  |
|--|
| (iii) From employers and/or other stakeholders.<br><br>1. Employer and internship supervisor ratings of students' performance<br>2. Surveys<br>3. Interviews<br>4. Program Advisory Committees |
|--|

Complete the following two tables.

1. Program KPI and Assessment Table

2. Program Action Plan Table

**Program KPI and Assessment Table**

| <b>KPI #</b> | <b>List of Program KPIs Approved by the Institution</b>  | <b>KPI Target Benchmark</b>     | <b>KPI Actual Benchmark</b>       | <b>KPI Internal Benchmarks</b>                     | <b>KPI External Benchmarks</b> | <b>KPI Analysis</b>   | <b>KPI New Target Benchmark</b> |
|--------------|--|---------------------------------|-----------------------------------|--|--------------------------------|---|---------------------------------|
| <b>1</b>     | The average ratings of faculty and students to the statement " there is close link between the Department's mission and its activities".   | <b>90%</b>                      | <b>92.7%</b>                      | <b>96.3% (2014)</b>                                |                                | Most of faculty members agrees that there is close link between the Department's mission and its activities           | <b>95%</b>                      |
| <b>2</b>     | The average ratings of staff to the questions in staff satisfaction survey<br>1) The administration is understanding and cooperative.<br>2) I can easily reach the administration. | <b>1) 95%</b><br><b>2) 100%</b> | <b>1) 95.5%</b><br><b>2) 100%</b> | <b>1) 100%</b><br><b>2) 99.3%</b><br><b>(2014)</b> |                                | Most of faculty members agrees that The administration is understanding and cooperative and can be easily reached.    | <b>1) 95%</b><br><b>2) 100%</b> |
| <b>3</b>     | Students' overall evaluation on the quality of their learning experiences.   | <b>90%</b>                      | <b>87.5%</b>                      | <b>75% (2014)</b>                                  |                                | Relatively high percentage of final year students agreed that they gain a satisfactory experience during their study. | <b>90%</b>                      |
| <b>4</b>     | Proportion of courses in which student evaluations were conducted during the year.   | <b>100%</b>                     | <b>90%</b>                        | <b>60% (2015)</b>                                  |                                | Evaluation should be conducted for all courses.   | <b>100%</b>                     |
| <b>5</b>     | Ratio of students to teaching staff.   | <b>10</b>                       | <b>4.2</b>                        | <b>3.6 (2014)</b>                                  | <b>7.4</b>                     | Ratio of students to teaching staff is very   | <b>8</b>                        |

|          |  |                                     |                                     |  |                                  |  |                                     |
|----------|--|-------------------------------------|-------------------------------------|--|----------------------------------|--|-------------------------------------|
|          |  |                                     |                                     |  | <b>Oklahoma State University</b> | low because number of chemistry students is low, meanwhile the department is serving large number of students of other departments.                            |                                     |
| <b>6</b> | Proportion of teaching staff with verified doctoral qualifications.  | <b>100%</b>                         | <b>100%</b>                         | <b>100% (2014)</b>                         |                                  | All of teaching staff have internationally verified doctoral degree with academic experience   | <b>100%</b>                         |
| <b>7</b> | Percentage of students entering programs who successfully complete first year.                               | <b>95%</b>                          | <b>85.7% M<br/>95% F</b>            |  |                                  | High percentage of students successfully complete the first year due to the general courses of preparatory year.   | <b>95%</b>                          |
| <b>8</b> | Proportion of students entering undergraduate programs who complete those programs in minimum time.          | <b>50%</b>                          | <b>8.2% M<br/>17% F</b>             | <b>19.5% M<br/>20.5% F (2015)</b>          |                                  | Very low percentage of students complete the program in minimum time because the specialty courses are concentrated in 3 years following the preparatory year. | <b>40%</b>                          |
| <b>9</b> | Proportion of graduates from undergraduate programs who within six months of graduation are:<br>(a) employed | <b>a) 50%<br/>b) 30%<br/>c) 20%</b> | <b>a) 25%<br/>b) 10%<br/>c) 65%</b> | <b>a) 10%<br/>b) 30%<br/>c) 65% (2014)</b> |                                  | Most of graduate students prefer managerial jobs or going for private business.  | <b>a) 50%<br/>b) 30%<br/>c) 20%</b> |



|           |  |            |             |                              |            |   |            |
|-----------|--|------------|-------------|------------------------------|------------|---|------------|
|           | (b) enrolled in further study<br>(c) not seeking employment or further study   |            |             |                              |            |   |            |
| <b>10</b> | Average rating on the adequacy of academic and career counselling on a five- point scale in an annual survey of final year students. | <b>4</b>   | <b>2.2</b>  | <b>2.7</b><br><b>(2014)</b>  |            | More career and academic counselling is needed.   | <b>4</b>   |
| <b>11</b> | Average overall rating of the adequacy of the library  | <b>4</b>   | <b>3.5</b>  | <b>3.3</b><br><b>(2015)</b>  |            | Central library contains large number of recent references in chemistry.  | <b>4</b>   |
| <b>12</b> | Average overall rating of the adequacy of the digital library  | <b>4.5</b> | <b>3.5</b>  | <b>2.5</b><br><b>(2015)</b>  |            | Electronic search of references is available on the library website, also the journals and thesis search.   | <b>4.5</b> |
| <b>13</b> | Average overall rating of the adequacy of IT services on a five- point scale of an annual survey                                     | <b>4</b>   | <b>3</b>    | <b>2.5</b><br><b>(2015)</b>  |            | A variety of high performance IT services are provided by the university, although number of computer terminals for students should be increased. | <b>4</b>   |
| <b>14</b> | Stakeholder evaluation of facilities & equipment   | <b>5</b>   | <b>3.91</b> | <b>4.1</b><br><b>(2014)</b>  |            | Lab equipment needs modernization with recent instruments.  | <b>5</b>   |
| <b>15</b> | Proportion of teaching staff leaving the institution in the past   | <b>5%</b>  | <b>10%</b>  | <b>6.4%</b><br><b>(2014)</b> | <b>10%</b> | Most of teaching staff left the department for  | <b>7%</b>  |

|           |   |                   |                             |                   |   |  |                   |
|-----------|---|-------------------|-----------------------------|-------------------|---|--|-------------------|
|           | year for reasons other than age retirement.   |                   |                             |                   | <b>Oklahoma State University</b>            | the end of their annual contract.  |                   |
| <b>16</b> | Number of refereed publications in the previous year per full time equivalent teaching staff.                               | <b>3</b>          | <b>5</b>                    | <b>3.6 (2014)</b> |   | Potential of research is very high due to facilities, labs and experienced teaching staff.               | <b>5</b>          |
| <b>17</b> | Number of citations in refereed journals in the previous year per full time equivalent faculty members                      | <b>40</b>         | <b>33.76</b>                |                   |   | Some of teaching staff are highly cited for publishing in high impact journals.                          | <b>40</b>         |
| <b>18</b> | Number of papers or reports presented at academic conferences during the past year per full time equivalent faculty members | <b>0.5</b>        | <b>0.58</b>                 | <b>0.4 (2012)</b> |   | Teaching staff prefers publishing in high impact international journals to get rewarded from university. | <b>1</b>          |
| <b>19</b> | Research income from external sources in the past year as a proportion of the number of full time faculty members           | <b>150,000 SR</b> | <b>180,000 SR (approx.)</b> |                   | <b>579,427 SR Oklahoma State University</b> | Some researchers have funded research projects.  | <b>150,000 SR</b> |
| <b>20</b> | Proportion of full time teaching and other staff actively engaged in community service activities                           | <b>40%</b>        | <b>16% (2015)</b>           | <b>19% (2014)</b> |   | Community service activities could be increased.   | <b>30%</b>        |

**Analysis of KPIs and Benchmarks:** (list strengths and recommendations)

**Strengths:**

- **Most of faculty members agrees that there is close link between the Department's mission and its activities**
- **Most of faculty members agrees that The administration is understanding and cooperative and can be easily reached.**
- **Relatively high percentage of final year students agreed that they gain a satisfactory experience during their study.**
- **All of teaching staff have internationally verified doctoral degree with academic experience.**

- Central library contains large number of recent references in chemistry.
- Electronic search of references is available on the library website, also the journals and thesis search.
- Potential of research is very high due to facilities, labs and experienced teaching staff.
- Some of teaching staff are highly cited for publishing in high impact journals.

**Recommendations:**

- More career and academic counselling for students is needed.
- Encouraging students to finish the program at minimum time.
- Encouraging students to apply for chemistry proficient jobs, and starting their own small business in chemical industry.
- Lab equipment needs modernization with recent instruments.
- Community service activities by teaching staff and students could be increased.

**NOTE** The following definitions are provided to guide the completion of the above table for Program KPI and Assessment.

**KPI** refers to the key performance indicators the programs used in the SSRP and are approved by the institution (if applicable at this time). This includes both the NCAAA suggested KPIs chosen and all additional KPIs determined by the program (including 50% of the NCAAA suggested KPIs and all others).

**Target Benchmark** refers to the anticipated or desired outcome (goal or aim) for each KPI.

**Actual Benchmark** refers to the actual outcome determined when the KPI is measured or calculated.

**Internal Benchmarks** refer to comparable benchmarks (actual benchmarks) from inside the program (like data results from previous years or data results from other departments within the same college).

**External Benchmarks** refer to comparable benchmarks (actual benchmarks) from similar programs that are outside the program (like from similar programs that are national or international).

**KPI Analysis** refers to a comparison and contrast of the benchmarks to determine strengths and recommendations for improvement.

**New Target Benchmark** refers to the establishment of a new anticipated or desired outcome for the KPI that is based on the KPI analysis.

### Program Action Plan Table

Directions: Based on your “*Analysis of KPIs and Benchmarks*” provided in the above Program KPI and Assessment Table, list the recommendations identified below.

| No. | Recommendations  | Action Points   | Assessment Criteria  | Responsible Person            | Start Date | Completion Date |
|-----|--|---|--|-------------------------------|------------|-----------------|
| 1   | More career and academic counselling for students is needed.                   | Increase number of teaching staff providing academic counselling for students.            | Students evaluation for academic counselling satisfaction                                | Department Chairman           | Sept.2016  | Jun. 2017       |
| 2   | Encouraging students to finish the program at minimum time                     | Rewards and honour prizes for the students finishing the program in less than 8 semesters | Increase of number of students finish the program in 8 semesters in the following years. | Department Chairman           | Sept. 2016 | Jun. 2017       |
| 3   | Encouraging students to apply for chemistry proficient jobs                    | Increasing contacts with local industry through visits and workshops.                     | Number of workshops held at the department for students.                                 | Department Chairman           | Sept. 2016 | Jun. 2017       |
| 4   | Lab equipment needs modernization with recent instruments.                     | Application for the needed fund and follow the purchasing procedure at university         | Number of updated instruments in students labs.  | Department Chairman           | Sept. 2016 | Jun. 2017       |
| 5   | Increase of computer terminals available to students.                          | Application for the needed fund and follow the purchasing procedure at university         | Number of computer terminals at computer room.   | Department Chairman           | Sept. 2016 | Jun. 2017       |
| 6   | Community service activities by teaching staff and students could be increased | Holding workshops to increase contacts of students with the community organizations       | Number of workshops held at the department for deferent community organizations          | Community services committee. | Sept. 2016 | Jun. 2017       |

Action Plan Analysis (List the strengths and recommendations for improvement of the Program Action Plan).

**Attachments:**

1. Copies of regulations and other documents referred to in template preceded by a table of contents.
2. Course specifications for all courses including field experience specification if applicable.

**Authorized Signatures**

| <b>Dean /<br/>Program Chair</b>   | <b>Name</b> | <b>Title</b> | <b>Signature</b> | <b>Date</b> |
|---|-------------|--------------|------------------|-------------|
| <b>Program Dean<br/>or Chair of<br/>Board of Trustees<br/>Main Campus</b> |             |              |                  |             |
| <b>Vice Rector</b>  |             |              |                  |             |