Kingdom of Saudi Arabia
National Commission for
Academic Accreditation & Assessment

المملكـة العربيـة السعوديـة
الهيئـــة الوطنيـــة للتقـويـم
والاعـتـمـاد الأكـاديـمـي

ATTACHMENT 2 (e)

Course Specifications

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specifications
(CS)

Course Specifications

Institution Najran University	Date of Report
College/Department : Faculty of Art and Science /Computer Science Department	

A. Course Identification and General Information

1. Course title and code:
   Compiler Design And analysis – 505CS-3
   (٥٠٥عال-٣)
2. Credit hours : (3)
3. Program(s) in which the course is offered.
   (If general elective available in many programs indicate this rather than list programs)
   Computer Science Program
4. Name of faculty member responsible for the course
   Dr. Ali Hadi Bokar
5. Level/year at which this course is offered: level 5 / Third Year
6. Pre-requisites for this course (if any)
   Non
7. Co-requisites for this course (if any)
   Non
8. Location if not on main campus
   main campus and female section
9. Mode of Instruction (mark all that apply)

a. Traditional classroom	☑	What percentage?	100%
b. Blended (traditional and online)	□	What percentage?	□
c. e-learning	□	What percentage?	□
d. Correspondence	□	What percentage?	□
f. Other	□	What percentage?	□

Comments:

We still teach this course using traditional methods but there is a plan to transform all course into electronic format using E-learning

B Objectives

1. What is the main purpose for this course? a) The student is familiar with the theoretical primarily in the field of design and construction of compilers. b) Understand the general structure of the compiler. c) Known as the necessary software tools to design and build compilers.
2. Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field)

C. Course Description (Note: General description in the form to be used for the Bulletin or handbook should be attached)

This course provides the student with an overview of the issues that arise in the design and construction of compilers for programming languages. The course explains techniques that have direct application to the construction of compilers, such as, lexical analyzer, parser, semantic analyzer, code optimizer, and code generation.

1. Topics to be Covered		
List of Topics	**No. of Weeks**	**Contact Hours**
Introduction: Compiler • Lexical Analyser • Syntax Analyzer • Semantic Analyzer • Intermediate code generator • Code Generator • Code Optimizer	2	4
Lexical analyzer • The role of the lexical analyzer • Input Buffer • Specification of tokens • Recognition of tokens • Finite Automat • From regular Expression to Automata • Design of lexical analyser	2.5	5

Syntax Analyzer • Context free grammars • Writing Grammars • Ambiguous Grammars • Top-Down parser • Bottom-Up parser	2	4
Type checking • Type systems • Specifications of simple type checker • Equivalence of type expressions • Type conversions • Overloading of functions and operators	2	4
Intermediate-Code Generator • Variants of syntax tree • Three Address • Types Expression • Type Checking • Control Flow • Switch-Statement	2.5	5
Code Generator • Issues in the Design of a Code Generator • The target Language • Addresses in the target code • Basic Blocks and flow graphs • Optimization of Basic Blocks • Simple Code Generator	2.5	5
Machine-Independent Optimization • Source Optimization • Introduction to Data-Flow Analysis • Foundation of data-Flow Analysis • Loops in Flow Graphs	2	4

1. Topics to be Covered in Lab		
List of Topics	**No. of Weeks**	**Contact Hours**
C++ Reviwe	2	4
Files in C++	2	4
Implementing simple lexical analyzer	2	4
DFA Implementation	2	4
NFA Implementation	2	4
Converting NFA into DFA	2	4
Compute Follow and First functions for LL(1) parser	2	4

2. Course components (total contact hours and credits per semester):

	Lecture	Tutorial	Laboratory	Practical	Other:	Total
Contact Hours	30		30			60
Credit	30		15			45

3. Additional private study/learning hours expected for students per week. 2 hours

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy

Course 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, assessment, and teaching.

The ***National Qualification Framework*** provides five learning domains. Course learning outcomes are required. Normally a course has should not exceed eight learning outcomes which align with one or more of the five learning domains. Some courses have one or more program learning outcomes integrated into the course learning outcomes to demonstrate program learning outcome alignment. The program learning outcome matrix map identifies which program learning outcomes are incorporated into specific courses.

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate 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 course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. **Fourth**, if any program learning outcomes are included in the course learning outcomes, place the @ symbol next to it.

Every course is not required to include learning outcomes from each domain.

	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	List principles, concepts and knowledge necessary in the design and construction of compilers	Lecture Discussion	Achievement test
1.2	State the main parts that make up the Compiler	Lecture Discussion Problem Solving Laboratory method	Achievement test
1.3	Memorize the theoretical background sufficient to continue the development and construction of compilers.	Lecture Discussion Problem Solving Laboratory method	Achievement test
2.0	**Cognitive Skills**		
2.1	Develop and construct compiler parts using software tools	Lecture Discussion Problem Solving Laboratory method	Achievement test
2.2	Write compiler parts for simple languages	Lecture Discussion Problem Solving Laboratory method	Achievement test
3.0	**Interpersonal Skills & Responsibility**		
3.1	Show an ability to work in group to design compiler parts.	projects	projects
4.0	**Communication, Information Technology, Numerical**		
4.1	Demonstrate an ability to Use mathematical expressions to describe the parts and components compiler	Lecture Discussion Problem Solving Laboratory method	Achievement test
4.2			
5.0	**Psychomotor**		
5.1			

Suggested Guidelines for Learning Outcome Verb, Assessment, and Teaching

NQF Learning Domains	Suggested Verbs
Knowledge	list, name, record, define, label, outline, state, describe, recall, memorize, reproduce, recognize, record, tell, write
Cognitive Skills	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
Interpersonal Skills & Responsibility	demonstrate, judge, choose, illustrate, modify, show, use, appraise, evaluate, justify, analyze, question, and write
Communication, Information Technology, Numerical	demonstrate, calculate, illustrate, interpret, research, question, operate, appraise, evaluate, assess, and criticize
Psychomotor	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.

5. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Mid-term exam	8	20
2	Quizzes	During the semester	10
3	Mid-Tem Lab Assignments	10	10
4	Final Lab Assignment	15	10
5	Final Exam	At the end of semester	40
6	Attendance	During the semester	10

D. Student Academic Counseling and Support

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

E. Learning Resources

1. List Required Textbooks
Alfred V. Aho, Ravi Sethi, and Jeffrey D. Ullman,
"*Compilers: Principles, Techniques, and Tools*"
Addison-Wesley, 2006.

2. List Essential References Materials (Journals, Reports, etc.)
Compilers: Principles and Practice May 2, 2012
by Parag H. Dave and Himanshu B. Da.

3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)
- Engineering a Compiler, Second Edition, 2011 by Keith Cooper, Linda
- Modern Compiler Design, 2012 by Dick Grune, Kees van Reeuwijk

4. List Electronic Materials (eg. Web Sites, Social Media, Blackboard, etc.)
http://en.wikipedia.org/wiki/Compiler

5. Other learning material such as computer-based programs/CD, professional standards or regulations and software.

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)

Classrooms for 20-30 students with data show

Laboratories 20-30 students with C++ software (Eclipse)

2. Computing resources (AV, data show, Smart Board, software, etc.)

Classrooms Should include data show and also laboratories

3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)
None

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching:

- ✓ distribution of a questionnaire for students to know how to achieve the goals in the theoretical and practical side.

2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor:

- ✓ Discussions with colleagues who specialize in teaching methods and means of learning.
- ✓ Self-evaluation of the performance of the teacher.
- ✓ Discussions with other colleagues who taught this course.

3 Processes for Improvement of Teaching

- ✓ Diagnose weaknesses and turn them into strengths.
- ✓ Discussions about the decision and methods of teaching
- ✓ Study the needs of the labor market of college graduates

4. Processes for Verifying Standards of Student Achievement (e.g. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution)

5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

Faculty or Teaching Staff: _________Dr Ali Hadi Bokar ___________

Signature: _________________________________ **Date Report Completed: _____________________**

Received by: _______________________________ **Dean/Department Head**

Signature: _________________________________ **Date: ________________**