

Faculty of Engineering Sciences and Technology

Activity # 01

Course:	Final Year Project 1	Coordinator:	Dr. Atiya Masood
Marks Allocated:	10 Marks	Time Allocated:	1 Week
CLO Allocated:	CLO-1 (BT Level- C3), CLO-2 (BT Level- C4), CLO-8 (BT Level- A2) and CLO – 10 (BT Level- A1)	PLO Allocated:	PLO1- Engineering Knowledge, PLO2- Problem Analysis, PLO 10- Communication and PLO11- Project Management

A. Project Title: CareerNexus
B. Funding / Sponsoring Organization (if any):
C. Project Start Date: 15-April-2025
D. Project Finish Date: 25-June-2025

E. Project Summary (200 - 300 words):

Introduction

In today's competitive and rapidly evolving job market, students and early-career professionals often struggle to make informed career decisions. The mismatch between academic learning and industry demands leads to confusion, underemployment, and missed opportunities. To address this challenge, there is a growing need for intelligent systems that can bridge the gap between education, skills, and career pathways.

CareerNexus is a smart career guidance and matching platform designed to help users identify, plan, and pursue suitable career paths. It leverages data-driven insights, user profiling, and machine learning techniques to offer personalized career recommendations, training resources, and job opportunities. By analyzing an individual's academic background, interests, and goals, CareerNexus aims to provide clear, actionable guidance aligned with current market trends. The platform is targeted at students, graduates, job seekers, and career counselors who require an efficient way to explore potential careers and make informed decisions. Its features include career path suggestions, learning roadmaps, resume building tools, and real-time job and internship listings.

CareerNexus not only empowers users with the knowledge to make better career choices but also assists institutions and employers in understanding talent needs and trends. With a user-centric design and modular architecture, the platform aspires to become a comprehensive solution in the career development ecosystem.

Project Summary:

CareerNexus is an intelligent career guidance and matching platform aimed at bridging the gap between academic pathways and industry expectations. It is designed to assist students, graduates, and job seekers in identifying suitable career paths based on their skills, interests, and current job market trends. The platform utilizes machine learning algorithms, user profiling, and career data analytics to provide personalized career recommendations, training resources, and job-matching services.

One of the core features of CareerNexus is its smart career mapping engine, which analyzes user input such as academic background, work experience, personality traits, and interests to suggest the most relevant career options. Additionally, it connects users with curated learning paths and real-world opportunities, including internships, projects, and job vacancies. By aggregating this data, CareerNexus aims to offer a one-stop career planning experience.

The system is being developed with a modular and scalable architecture, ensuring it can be easily expanded to support different user groups and evolving industry needs. The backend will handle user management, recommendation logic, and data integration with external APIs. The frontend will prioritize usability and accessibility for students, educators, and employers.

CareerNexus addresses the growing need for a structured, data-driven approach to career planning in today's rapidly evolving job market. It provides not just options, but a guided journey tailored to the individual's unique profile.

F. Objective, Benefits and Deliverables

A. Project Objective

CareerNexus is a smart, web-based career guidance platform that uses AI and modern tools to help students and job seekers find suitable career paths. The platform combines resume analysis, aptitude and psychometric testing, and real-time job and university recommendations, along with an integrated chatbot for user support. The goal is to simplify the career decision-making process by making it personalized, automated, and accessible.

- **Resume Evaluation**

Analyze the user's resume using NLP to detect strengths and weaknesses, and generate suggestions for improvement.

- **Career & Personality Assessment**

Conduct aptitude and psychometric tests to assess the user's skills, interests, and behavioral traits.

- **Intelligent Recommendations**

Based on test results and resume content, suggest relevant career fields, academic programs, and real-time job opportunities.

- **Conversational Support**

Guide users through the platform using an AI-powered chatbot that can answer questions and assist with navigation.

B. Project Benefits

- **Personalized Guidance**

Each user receives career suggestions specifically tailored to their profile, improving decision-making.

- **Resume Optimization**

Users can enhance their resumes through targeted feedback, increasing chances of passing ATS filters.

- **Skill Gap Awareness**

Users are informed about the skills they lack compared to current industry demands, encouraging further learning.

- **Real-Time Opportunities**

The system recommends live job links and academic programs that match the user's career direction.

- **Enhanced User Experience**

The chatbot provides smooth, natural interactions and guidance throughout the system.

- **Accessibility & Portability**

Being fully web-based, CareerNexus is accessible from any device with internet, without installation.

C. Project Deliverables

- **Web-Based Application**

- Resume analyzer with NLP (spaCy)
- Aptitude and psychometric test modules
- University and job suggestion engine
- Integrated AI chatbot (Dialogflow)
- Clean and responsive UI (HTML/CSS/JS)

- **Cloud Database Integration**

Firebase Firestore for storing user data, test results, and resume feedback

- **Final Year Project Documentation**

Comprehensive report covering objectives, tools, methodology, results, and screenshots

G. Plan:

Development / Research Methodology:

Introduction

CareerNexus is a comprehensive web-based platform that provides intelligent career support using Artificial Intelligence (AI), Natural Language Processing (NLP), and cloud technologies. The project is aimed at guiding users—especially students and early-career professionals—through the career selection process by analyzing resumes, evaluating aptitude and personality, and recommending relevant job and academic opportunities. Agile methodology (Scrum in particular) is employed to ensure the system is built in modular, testable phases, with continuous feedback loops that make it flexible and user-oriented.

Agile Methodology Overview

Agile is a proven methodology for software development that encourages adaptive planning, evolutionary development, early delivery, and continual improvement. Scrum, a specific Agile framework, is best suited for CareerNexus due to its iterative and incremental development cycles. Each sprint (typically lasting 2–3 weeks) will focus on delivering specific components of the system—such as the resume

analyzer, psychometric test engine, or chatbot integration—with functional increments reviewed and refined regularly.

Key Scrum elements used in the project include:

- **Sprint Planning:** Team decides the user stories and backlog items to deliver.
- **Daily Standups:** Quick progress updates and issue tracking.
- **Sprint Review:** Demonstration of completed tasks to stakeholders.
- **Sprint Retrospective:** Internal reflection on the process for improvements.

Applicability to CareerNexus

CareerNexus involves multiple interconnected components that require collaborative planning and phased development. Scrum allows the team to:

- Develop modules like Resume Analyzer, Test System, and Chatbot in isolated sprints.
- Involve academic supervisors, testers, and users early in the development loop.
- Reprioritize features based on real-time feedback and system testing.

Early sprints focus on core logic—such as resume parsing and aptitude test scoring—while later sprints enhance UI, chatbot flow, and database connectivity.

Key Features of the Project

1. Resume Analyzer

Uses spaCy NLP models to extract skills, experience, and education from uploaded resumes. The extracted data is compared with job-specific skillsets to generate improvement feedback.

2. Aptitude & Psychometric Testing

Multiple-choice questions evaluate the user’s logic, reasoning, and personality. Scoring logic is mapped to specific career fields based on established psychological models like MBTI or Big Five.

3. Career Recommendations

Matches user profile (from resume and test results) to predefined career fields, offering practical guidance aligned with user strengths.

4. Job & University Suggestion System

Integrates with Firebase to fetch relevant job listings or academic programs based on user preferences and profile.

5. AI Chatbot (Dialogflow)

Interactive assistant that guides the user through different modules, answers career-related questions, and provides system navigation.

6. Web-Based UI

HTML/CSS/JS-based interface that allows resume upload, test participation, and viewing of results in a clean, intuitive format.

Key Principles of Agile Methodology in Scrum

- **Iterative Development:** Deliver features in working increments at the end of each sprint.
- **Collaboration:** Maintain constant interaction between team members and stakeholders.

- **Adaptability:** Adjust scope and features as the user requirements evolve.
- **Transparency:** Use sprint boards, burn-down charts, and reviews to maintain visibility.
- **Continuous Improvement:** Conduct retrospectives to identify and apply process improvements.

High-Level Algorithm Overview

Module 1: Resume Analyzer

1. User uploads resume (PDF).
2. Resume is converted to text using pdfplumber.
3. Text is processed via spaCy NLP.
4. Named entities and skill phrases are extracted.
5. These are matched against a skill dataset.
6. A feedback report is generated (missing skills, improvement tips).

Module 2: Aptitude & Psychometric Testing

1. User selects and starts a test.
2. Answers are scored in real-time.
3. Results are classified under personality types.
4. Suitable career categories are assigned.
5. Feedback is stored and displayed.

Module 3: Career/Job/University Matching

1. System combines test + resume data to build user profile.
2. Queries are made to Firebase database.
3. Results (job/university links) are filtered and displayed.

Module 4: Chatbot Interaction

1. User types query (e.g., “Suggest a job”).
2. Dialogflow classifies intent.
3. Response is triggered based on predefined actions or dynamic backend call.
4. Response shown in chat window with follow-up options.

Justification

Agile Scrum methodology is ideal for CareerNexus because:

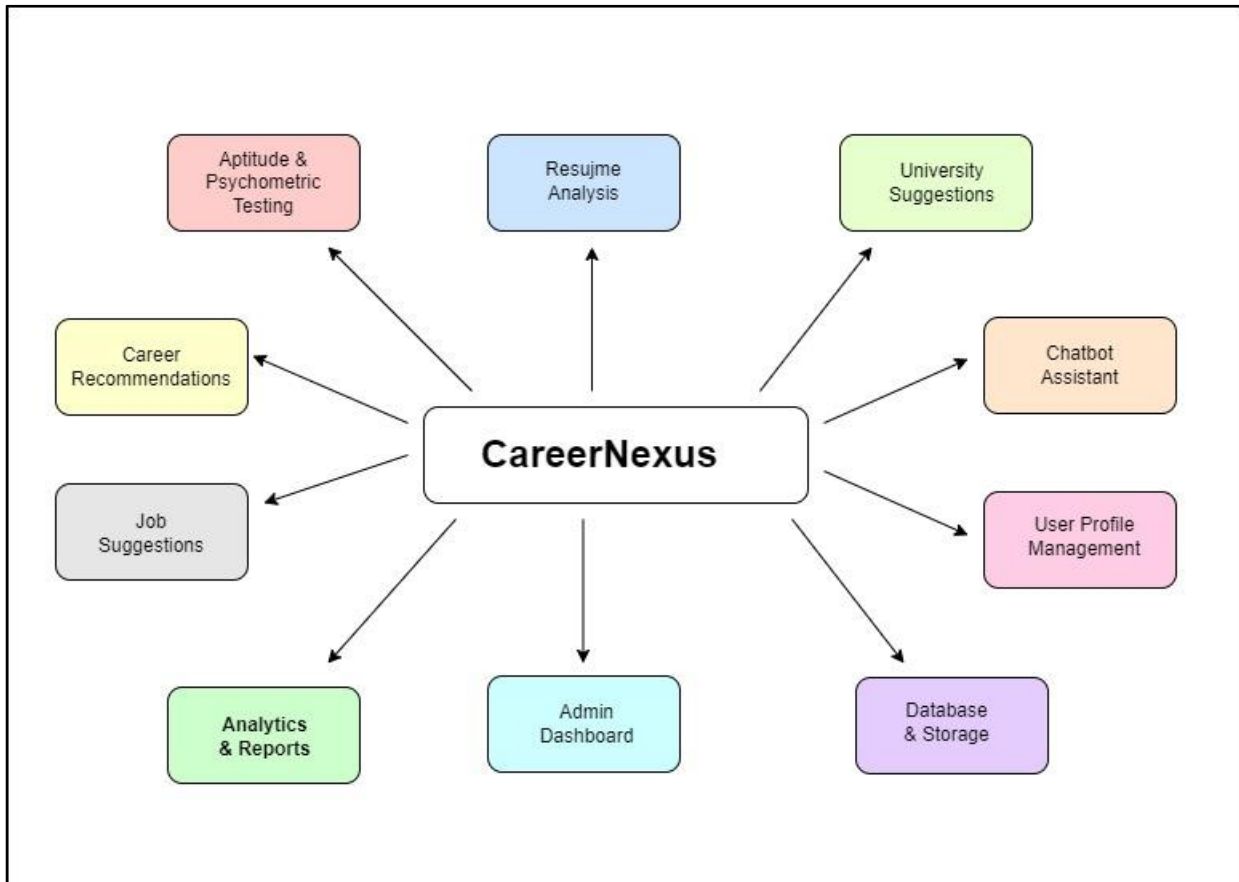
- **Flexibility in Scope:** New test types or resume formats can be added easily.
- **User-Centric Development:** Early feedback allows quick course correction.
- **Risk Mitigation:** Frequent reviews reduce chance of system-wide issues.
- **Feature Prioritization:** Critical features like resume checking are developed first.
- **Team Productivity:** Regular retrospectives improve team output and coordination.

Agile also ensures that CareerNexus stays relevant to industry standards by allowing dynamic skill dataset updates and career-path modifications as trends evolve.

Conclusion

Agile methodology, especially Scrum, has proven to be an efficient approach for developing modular, user-centered web applications like CareerNexus. It enables the team to deliver high-priority features first, continuously test, and improve based on real feedback. The modular sprint-based approach allows for greater flexibility, better time management, and improved collaboration. Each component—resume analysis, aptitude testing, chatbot, and career matching—is developed, tested, and refined in phases to build a powerful and useful solution for real users. The outcome is a system that is scalable, intelligent, and capable of evolving with the needs of its users.

Block Diagram:



The diagram represents the core structure of the **CareerNexus** system, with CareerNexus functioning as the central hub that connects all major modules required for intelligent career guidance. Surrounding this central platform are key functional components that together build a comprehensive, user-focused solution.

The **Resume Analysis** module extracts skills, qualifications, and experience from user-uploaded resumes using NLP techniques, and provides constructive feedback for improvement. **Aptitude and Psychometric Testing** evaluates users' personality traits and logical reasoning to identify the most suitable career fields.

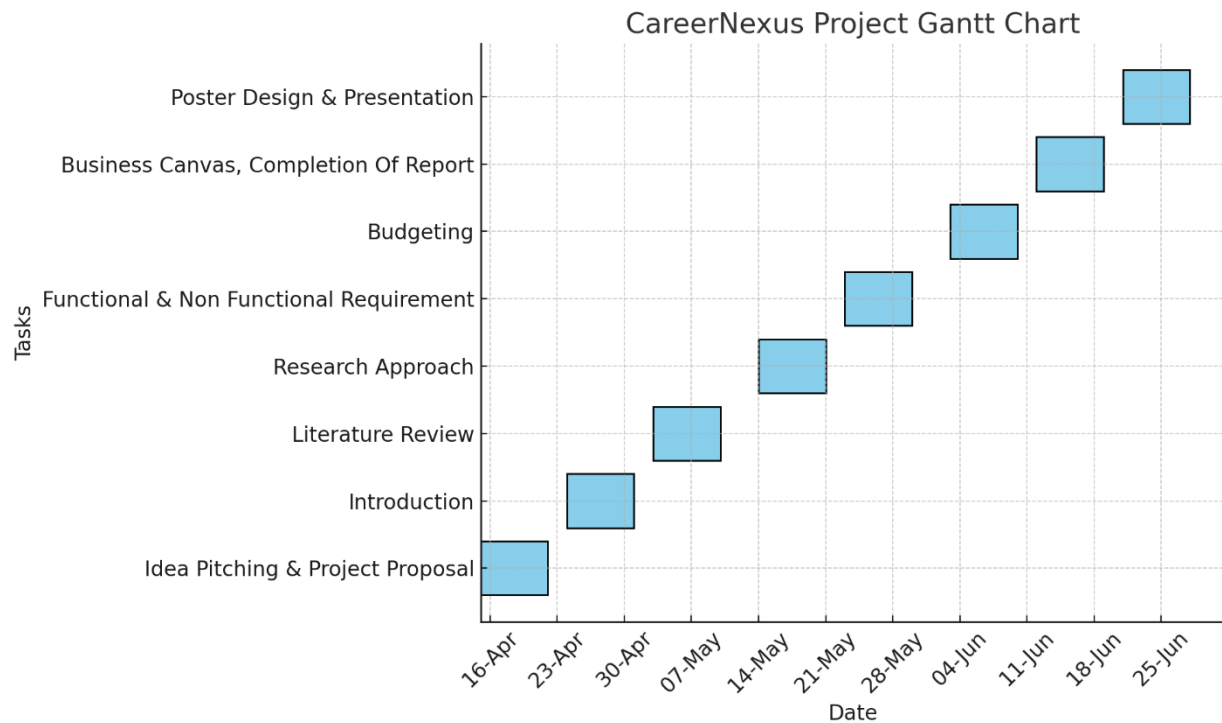
Career Recommendations uses the results from both the resume analyzer and test modules to suggest personalized career paths aligned with the user's profile. **Job and University Suggestions** link users to relevant opportunities by comparing their profile data with available academic programs and job listings, helping bridge the gap between potential and opportunity.

An **AI Chatbot**, powered by Dialogflow, enhances user interaction by providing real-time assistance, answering queries, and guiding users through various features of the platform. **User Profile and Data Storage**, backed by Firebase, ensures that all resume data, test results, and feedback are securely stored and accessible.

These interconnected modules make CareerNexus a complete, interactive, and AI-supported web platform aimed at guiding users toward better career decisions through automation, personalization, and real-time recommendations.

H. Project Schedule / Milestone Chart

1	Task Name	Duration (days)	Start	Finish	Predecessor
2	Idea Pitching & Project Proposal	7	15-Apr-2024	22-Apr-2024	
3	Introduction	7	24-Apr-2024	01-May-2024	1
4	Literature Review	7	03-May-2024	10-May-2024	2
5	Research Approach	7	14-May-2024	21-May-2024	3
6	Functional & Non Functional Requirement	7	23-May-2024	30-May-2024	4
7	Budgeting	7	03-Jun-2024	10-Jun-2024	5
8	Business Canvas, Completion Of Report	7	12-Jun-2024	19-Jun-2024	6
9	Poster Design & Presentation	7	21-Jun-2024	28-Jun-2024	7



I. Key Milestones of the Project / Project Management:			
S. No.	Elapsed time since start of the project	Milestone	Deliverable
1.	Week 01 – 04	Project Initiation & Background Study	Idea Pitching, Project Proposal, Literature Review, Introduction
2.	Week 05	Research & Requirement Analysis	Research Approach, Functional & Non-Functional Requirements
3.	Week 06	System Analysis	Problem Statement, Objective Analysis, System Overview
4.	Week 07	Use Case & Modeling	Use Case Diagram, Context Diagram, Functional Modeling
5.	Week 08	Budgeting & Planning	Budget Sheet, Gantt Chart, Project Timeline
6.	Week 09	Business & Feasibility Study	Business Model Canvas, SWOT Analysis, Feasibility Report
7.	Week 10	Prototype Design	Wireframes, UI Mockups, UX Flow
8.	Week 11	Prototype Development	Working Prototype Screens / Clickable Model
9.	Week 12	Case Studies Review	Case Studies of Similar Systems with Findings
10.	Week 13	Pros & Cons Evaluation	Advantages, Disadvantages, Risk Analysis
11.	Week 14	Poster & Presentation Prep	Final Poster, Presentation Slides
10.	Week 15	Finalization & Submission	Final Report, Poster, Presentation, Backup Documents
J. Final deliverable of the project (please tick one of the following)			
<input type="checkbox"/> Hardware system		<input type="checkbox"/> Software system	<input type="checkbox"/> HW/SW integrated system
<input type="checkbox"/> Software simulation results		<input type="checkbox"/> Comparative study	<input type="checkbox"/> Mobile App
<input checked="" type="checkbox"/> Web App		<input type="checkbox"/> Other (please specify)	
K. Equipment required for the project with Estimated Cost:			
<p>Development Workstation – Used for all development tasks including design, coding, and documentation. Estimated Cost: PKR 90,000 – 150,000 depending on specifications Domain Name (e.g., careernexus.com) – To provide a professional web presence for the project. Estimated Cost: PKR 2,500 – 3,500/year Server Infrastructure (Cloud Hosting & Database) – Using free-tier services like Firebase, Render, or GitHub Pages for hosting and storage. Estimated Cost: Free (within student/free-tier limits) (If upgraded: PKR 1,000 – 5,000/month) Software Tools (VS Code, Figma, etc.) – For development, UI/UX design, and documentation. Estimated Cost: Free (open-source and student-access tools)</p>			

GitHub (with Student Developer Pack) – For version control and deployment.
Estimated Cost: Free

L. How many PLOs are you covering in this Proposal? List all PLOs

1. PLO-1: Engineering Knowledge

Apply knowledge of computing, mathematics, science, and engineering fundamentals to solve complex problems.

2. PLO-2: Problem Analysis

Identify, formulate, and analyze complex problems reaching substantiated conclusions using first principles of computing and mathematics.

3. PLO-3: Design/Development of Solutions

Design solutions and systems that meet user-defined needs with appropriate consideration for public health, safety, cultural, societal, and environmental concerns.

4. PLO-4: Investigation

Conduct investigations of complex problems using research-based knowledge and methods including design of experiments, analysis, and interpretation of data.

5. PLO-5: Modern Tool Usage

Create, select, and apply appropriate techniques, resources, and modern IT tools (like GitHub, Figma, Firebase, etc.) for system development and deployment.

6. PLO-9: Individual and Team Work

Function effectively as an individual and as a member or leader in diverse teams and multidisciplinary settings.

7. PLO-10: Communication

Communicate effectively on complex computing activities with peers and society at large through reports, documentation, and presentations.

8. PLO-11: Project Management and Finance

Demonstrate knowledge of project management and finance principles and apply them to computing projects as a member and leader.

1. Engineering Knowledge ☒
 3. Design/ Development of Solution ☒
 5. Modern Tool Usage ☒
 7. Environment & Sustainability ☐
 9. Individual & Team Work ☒
 11. Project Management ☒

2. Problem Analysis ☒
 4. Investigation ☒
 6. The Engineer & Society ☐
 8. Ethics ☐
 10. Communication ☒
 11. Lifelong learning ☐

M. How many SDGs are you covering in this Proposal? List all SDGs

1.No poverty <input type="checkbox"/>	10. Reduced inequalities <input checked="" type="checkbox"/>
2.Zero hunger <input type="checkbox"/>	11. Sustainable cities and communities <input type="checkbox"/>
3.Good health and well being <input type="checkbox"/>	12. Responsible consumption and production <input type="checkbox"/>
4.Quality education <input checked="" type="checkbox"/>	13. Climate action <input type="checkbox"/>
5.Gender equality <input type="checkbox"/>	14. Life below water <input type="checkbox"/>
6.Clean water and sanitation <input type="checkbox"/>	15. Life on land <input type="checkbox"/>

7.Affordable and clean energy <input type="checkbox"/>	16. Peace, justice and strong institutions <input type="checkbox"/>
8.Decent work and economic growth <input checked="" type="checkbox"/>	17. Partnership for the goals. <input type="checkbox"/>
9.Industry innovation and infrastructure <input checked="" type="checkbox"/>	

N. WP's Through This Project:

WP's	How it is addressed in this Project
Engineering Knowledge	Applied computer science and software engineering principles to design and develop a functional career guidance platform.
Problem Analysis	Identified gaps in current career guidance systems and analyzed user requirements to propose a viable solution.
Design/Development of Solutions	Designed a complete system (CareerNexus) including UI/UX, backend logic, and data flow based on user needs.
Modern Tool Usage	Used modern tools like VS Code, GitHub, Figma, Firebase, and cloud platforms to design, develop, and deploy the project.
Individual and Team Work	Worked independently and collaboratively within a team to divide tasks, solve problems, and meet deadlines.
Communication	Prepared professional documentation, reports, and presentations to communicate the design, progress, and outcomes of the project
Project Management and Finance	Created Gantt charts, budgeting sheets, and task tracking logs to plan and manage resources effectively.
Ethics and Professionalism	Ensured data privacy, user consent, and responsible use of technology throughout the system.
Lifelong Learning	Researched new technologies and tools throughout the project to improve skills and adapt to project needs.

Reference:

Attributes	WP1 and some or all of WP2 to WP7
Solution Complexity and Knowledge	WP1: Requires advanced knowledge in career development and technology, using an analytical approach based on well-established principles.
Range of Conflicting Requirements	WP2: Involves dealing with conflicting technical and career-related issues, balancing various stakeholder needs.
Depth of analysis required	WP3: No clear solution, needs conceptual thinking and innovative analysis to develop abstract models.
Familiarity of issues	WP4: Involves rare or new issues in career development or technology.
Extent of applicable codes	WP5: Problems extend beyond conventional standards and codes, requiring custom solutions
Stake-holder involvement and conflicting requirements	WP6: Involves multiple stakeholders with differing needs and expectations.
Interdependence	WP7: Complex problems with interdependent components, such as system integration, user interfaces, and algorithms.

Key for WK (knowledge profile):

WK	Short Name
WK1	Career Development Theory
WK2	User Interface Design
WK3	Data Analytics
WK4	Machine Learning and Algorithms
WK5	Software Engineering
WK6	System Architecture
WK7	Career Counseling Practices
WK7	Emerging Trends in Technology

Supervisor Signature