Software Project Management Plan

Study Buddy
Social Media Platform

Version 1.0
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Revisions

Version	Primary Author	Description of Version	Date Completed
1.0	All Team Members	Original Document	10/5/2025
1.1			
1.2			
1.3			
1.4			
1.5			

Table of Contents

1. Introduction

1.1 Project Overview

1.1.1 Purpose

The Study Buddy platform aims to increase productivity in students and bring them together in an effortless manner. The application provides a space where students can easily connect and form study groups. They would then be able to share resources about their chosen topic. Its purpose also includes combating student loneliness by expanding the reach of academic collaboration beyond the classroom. The web application supports educational success and fosters a sense of belonging among students.

1.1.2 Scope

In-scope: Initially, the application would be available only to CSUN students for their classes taken at the university. The release will prioritize a reliable and user-friendly platform for students to share their interests and career goals. The intended audience would be CSUN students seeking a study group.
Out of scope: Beyond the initial release, the application will be extended to other college campuses. Native apps for IOS or Android would also be developed. Seamless integration into Canvas or the CSUN portal would also be a long-term goal. Eventually, the web application would be released to the general public.

1.1.3 Assumptions and Constraints

We will assume that users have an up-to-date web browser and a stable internet connection. Students, being the users, will also have a motivation or desire to find groups and contribute to the platform's social environment in a safe manner. The project is constrained by the limited media storage capacity resulting from our reliance on free databases available at the time of development.

1.2 Literature Review

1.2.1 Social Need and Impact

- *"Improving Student Engagement" by Taylor & Parsons (2011)*

  25% - 66% of students are disengaged at school which lessens their motivation to continue learning over time. Past curriculums were to try to rescue failing students but future plans will shift to make the school more responsible for being more engaging to students. It suggests letting students influence the curriculum by adding more of their interests to help align with students. Schools should give students more choices, use more collaboration, and have different paces for learning. Study Buddy will help students be more effective by being more engaging and collaborative since many students struggle with motivation when studying alone. The article shows students are commonly disengaged and finds that student-led, not teacher-led, collaboration is more impactful. It will let students match with similarly paced group members, topics, and forms of studying.

- *The Magnitude of Loneliness and Associated Risk Factors among University Students: A Cross-Sectional Study*

  New academic environments such as starting college, create stress in students which lead to loneliness which is linked to depression and lower grades. The article suggests that the loneliest 26% of students are freshman, sophomores, women, financially poor students, smokers, and dorm residents. The article suggests colleges should create social programs targeted to those groups to decrease loneliness. Occasional social events don't create the same kind of connections that students need. However all students need to study everyday and would greatly benefit from constant social connection through the free Study Buddy application.

1.2.2 Similar Websites/Apps

- *Meetup.com*

  Meetup is a platform that connects individuals with similar interests to find, join, and host group events over a shared activity. It aims to foster real-life relationships by offering people a chance to gain a sense of belonging.

- *Vampr*

  Vampr is a social media platform that connects musicians with a desire to collaborate with other musicians to create projects, play concerts, or have a jam session. It utilizes a similar swiping mechanism that dating apps are notable for.

1.2.4 Tools

- Machine Learning Algorithms
  - Collaborative Filtering (CF):
    - Learning from user behavior (who studied with whom, which groups they joined, events they attended).
      - Pros: Learns patterns from community activity.
      - Cons: Struggles with "cold start" (new users with no history).
  - Content-Based Filtering:
    - Using user profile data (major, classes, schedule, study preferences) to suggest peers/groups.
      - Pros: Works well for new users.
      - Cons: Limited diversity of matches.
  - Hybrid Recommendation Systems:
    - Combining CF + Content-based (Netflix and LinkedIn use this approach).
  - K-Means Clustering / MiniBatch K-Means:
    - Grouping students based on features (e.g., enrolled courses, study times, GPA, goals).
  - Spectral Clustering or DBSCAN:
    - Useful if student similarity is non-linear (e.g., overlapping interests, multi-class memberships).
  - Hierarchical Clustering:
    - Helping form sub-groups within larger communities (e.g., course cohort into specific study niches).
  - Text Classification & Topic Modeling:
    - Algorithms: Naïve Bayes, Logistic Regression, BERT, LDA.
    - Automatically categorizing forum posts (questions, resources, motivation).

- Semantic Search with Embeddings:
    - Using sentence embeddings (e.g., Sentence-BERT, OpenAI embeddings) to connect similar questions or match people based on free-text study goals.
- Toxicity Detection (Community Health):
    - Models like Google Perspective API or fine-tuned transformers to detect negative/harassing content.
- Reinforcement Learning (RL):
    - Can adapt suggestions (e.g., “next best study event” or “buddy reminder”) based on past user behavior
- Contextual Bandits:
    - Lightweight version of RL, balances exploring new matches vs. exploiting successful ones.
- Sentiment Analysis:
    - Detecting emotional states in posts/chats into recommending supportive groups or resources.
- Time-Series Forecasting:
    - Predicting peak study room usage into smart booking suggestions.
- Association Rule Mining (Apriori, FP-Growth):
    - “Students who booked this room also attended this event.”

- *Python Libraries*

  Hybrid (content + behavior)
    - Libraries
        - Content: scikit-learn (TF-IDF, cosine) or sentence-transformers (semantic embeddings)
        - Behavior: implicit (ALS on interactions), LightFM (hybrid CF), Surprise (benchmarking)
        - ANN retrieval: faiss or annoy

  Clustering for auto-forming study groups
    - Libraries:
        - scikit-learn (KMeans, MiniBatchKMeans, Spectral)
        - hdbscan (density-based)
        - umap-learn (pre-reduce dims, helps improve clustering)
    - Features: course one-hots, schedule availability vector (168-d weekly slots), embeddings of goals/interests

  Training
    - Libraries: scikit-learn, LightFM, Umap-learn

  NLP for forums/chats & semantic search
    - Libraries: transformers (DistilBERT/RoBERTa), sentence-transformers (search/matching), spacy (lightweight NER), scikit-learn (classifiers)
    - Use cases: tag posts (question/resource/event), deduplicate Q&A, route lonely students to supportive groups, semantic search across threads/resources.

2. Project Organization

2.1 Roles and Responsibilities

Team Member	Roles	Email
Matthieu Resurreccion	Lead Engineer, Full-Stack Developer, Scrum Master	matthieu.resurreccion.531@my.csun.edu
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2.2 Tools and Techniques

- *Project Management*
  - GitHub - Version Control
  - Jira - Agile Project Management Tracker
- *Stack*
  - React - UI Development
  - Express.js/Node.js - Backend Development
  - MongoDB - Database
- *Other Services/APIs*
  - Clerk - User Authentication
  - INNGEST - Background Job Handler and Scheduler
  - ImageKit - Media Storage and Optimization
  - Vercel - Web Hosting and Deployment
- *Machine Learning*
  - *Python libraries/frameworks*
  - *Machine learning tools*

3. Project Management Plan

3.1 Tasks

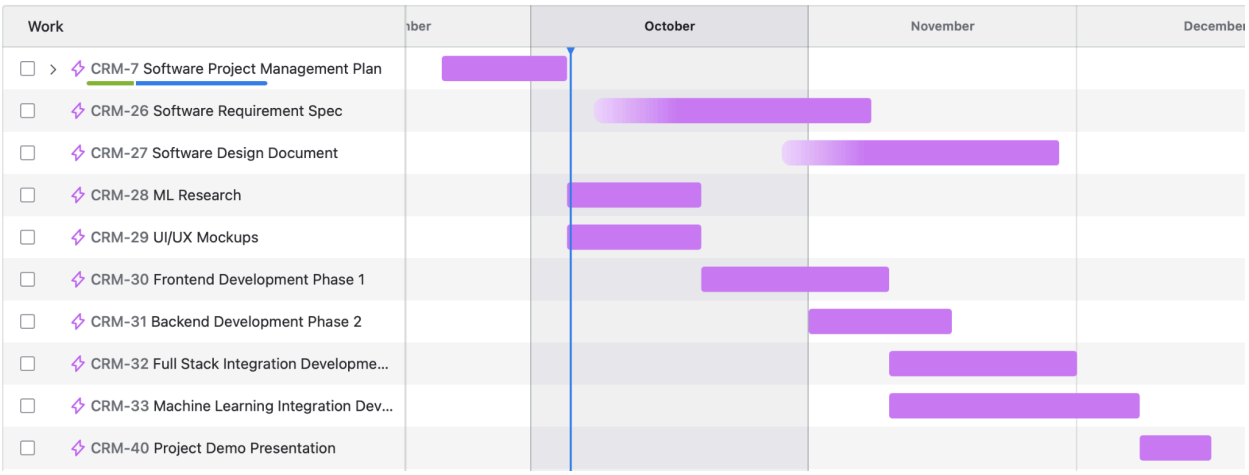
Task	Task Description	Date
UI/UX Design Mockup	Conduct UI/UX research and design frontend mockups that align with the goal of the project.	10/5/25
ML Research	Conduct research and experiment with machine learning algorithms for a profile-based matchmaking system.	10/5/25
Begin Coding		10/20/25
Development Phase 1: Frontend Components	Design key frontend React components including Home, Discover, and Explore.	10/20/25
Development Phase 2: Backend Server	Develop an Express.js server to handle authentication, database operations, and image storage.	Fall Semester
Development Phase 3: Connect Frontend and Backend	Integrate the React frontend with the Express backend to enable dynamic data flow, authentication, and real-time updates between the client and server.	Fall Semester
Development Phase 4: Implement ML Matchmaking	Incorporate the trained machine learning model into the application to perform profile-based matchmaking and personalized recommendations.	Fall Semester

3.2 Assignments

Task	Due
Software Project Management Plan	10/5/25
Progress Report #3	10/5/25
Progress Report #4	10/19/25
Progress Report #5	11/2/25
Software Requirement Spec (SRS)	11/7/25
Progress Report #6	11/19/25
Software Design Document (SDD)	11/28/25
Progress Report #7	12/3/25
Project Presentation	12/8/25
Progress Report #8	12/15/25

Project Presentation Source Code	12/15/25
Peer Review #1	12/17/25

3.3 Timetable



4. Additional Material

4.1 Definitions, Acronyms, and Abbreviations

- **AI - Artificial intelligence**
- **ALS - Alternating Least Squares**
- **ANN - Approximate Nearest Neighbors**
- **Clustering - Grouping similar data points together based off characteristics**
- **Cosine - Measure of how similar two feature vectors are**
- **Feature - Measurable property of data**
- **TF-IDF - converts text into numerical vectors based on word frequency**
- **Vector - List of numbers representing features**

4.2 Example

4.3 Appendices

4.4 References

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