

# CSC 540 - DATABASE MANAGEMENT CONCEPTS & SYSTEMS

**Project Title : COURSE REGISTRATION SYSTEM**

## **Project Deliverable : 2** **(Application Constraints, Functional Dependencies)**

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### **Functional Dependencies**

Entity/Relationship	Functional Dependencies
Course	cid,did->title,level, min_credit,max_credit,sp_permission,pre_req ,GPA_requirement
Student	sid- >Fname,Lname,email,phone,GPA,did,addres s,pwd,Student_special_id

Class	classid->cid,fac_id,capacity,waitlist_capacity,location,day,s_time,e_time,semester,enroll_startdate,enroll_enddate
Admin	EmplyID->SSN,Fname,Lname,pwd
Enrollment	sid,classid->grade,fac_id,status
Student_special	Student_special_id->level, residency, min_credit, max_credit, hourly_billing_rate
Faculty	fac_id->Fname,Lname,did,SSN
Special Permission	sid,classid->Status,ApprovedBy,ApprovedOn
Department	DID->Dept_name
Account	SID,Bill_ID->BillAmount

### Functional Constraints

List of Entities	Attributes
Course	CID - INT NOT NULL, Title - VARCHAR NOT NULL , DID INT NOT NULL, SP_Permission BOOLEAN NOT NULL, Pre-req BOOLEAN NOT NULL, Level INT NOT NULL, Min_credit FLOAT NOT NULL, Max_credit FLOAT NOT NULL, GPA_Requirement FLOAT NOT NULL, <b>PRIMARY KEY(CID, DID),</b> <b>FOREIGNKEY (SP_Permission) REFERENCES (Special Permission),</b> <b>FOREIGNKEY (DID) REFERENCES (Department)</b>
Student	SID - INT UNIQUE NOT NULL, Fname - VARCHAR NOT NULL, Lname - VARCHAR, Email - VARCHAR NOT NULL UNIQUE, Phone VARCHAR UNIQUE , GPA - FLOAT NOT NULL DEFAULT 0, DID - INT NOT NULL , Address - VARCHAR NOT NULL,

	PWD VARCHAR NOT NULL, Student_special_id INT NOT NULL, <b>PRIMARY KEY(SID),</b> <b>FOREIGNKEY (DID) REFERENCES (Department),</b> <b>FOREIGNKEY (Student_special_id) REFERENCES (Student Special)</b>
Class	ClassID INT UNIQUE NOT NULL AUTOINCREMENT, CID INT NOT NULL, Fac_id INT NOT NULL, Capacity INT NOT NULL, Waitlist_capacity INT NOT NULL, Location- VARCHAR NOT NULL, Day - VARCHAR NOT NULL , S_time - TIME NOT NULL, E_time - TIME NOT NULL, Semester - INT NOT NULL, Enroll_startdate - DATE NOT NULL, Enroll_enddate - DATE NOT NULL <b>PRIMARY KEY(ClassID),</b> <b>FOREIGNKEY (Fac_id) REFERENCES (Faculty),</b> <b>FOREIGNKEY (CID) REFERENCES (Course)</b>
Admin	EmplID INT UNIQUE NOT NULL, SSN INT UNIQUE, Fname - VARCHAR NOT NULL, Lname - VARCHAR, PWD - VARCHAR NOT NULL <b>PRIMARY KEY(EmplID)</b>
Enrollment	SID - INT NOT NULL, Grade - VARCHAR , ClassID - INT NOT NULL, Status VARCHAR NOT NULL, <b>PRIMARY KEY(SID, ClassID),</b> <b>FOREIGNKEY (SID) REFERENCES (Student),</b> <b>FOREIGNKEY (ClassID) REFERENCES (Class)</b>
Student Special	Student_special_id INT NOT NULL UNIQUE, Level INT NOT NULL, Residency INT NOT NULL, Min_credit - FLOAT NOT NULL, Max_credit - FLOAT NOT NULL, Hourly_billing_rate - FLOAT , <b>PRIMARYKEY(Student_special_id)</b>
Faculty	Fac_id INT NOT NULL UNIQUE, Fname VARCHAR NOT NULL, Lname VARCHAR, DID INT NOT NULL,

	SSN - INT, <b>PRIMARYKEY(Fac_id),</b> <b>FOREIGNKEY (DID) REFERENCES (Department)</b>
Special Permission	SID INT NOT NULL, ClassID INT NOT NULL, Status VARCHAR NOT NULL, ApprovedBy - VARCHAR NOT NULL, ApprovedOn - DATE NOT NULL, <b>PRIMARYKEY(SID, ClassID),</b> <b>FOREIGNKEY (SID) REFERENCES (Student),</b> <b>FOREIGNKEY (ClassID) REFERENCES (Class)</b>
WaitList	SID INT NOT NULL, ClassID INT NOT NULL, <b>FOREIGNKEY (SID) REFERENCES (Student),</b> <b>FOREIGNKEY (ClassID) REFERENCES (Class)</b>
PreReq	CID INT NOT NULL, Prereq_coureID INT NOT NULL, <b>FOREIGNKEY (CID) REFERENCES (Course)</b>
Department	DID - INT NOT NULL, Dept_name - VARCHAR NOT NULL <b>PRIMARYKEY(DID)</b>
Account	Bill_ID - INT NOT NULL, SID - INT NOT NULL, BillAmount - INT NOT NULL, <b>PRIMARYKEY(Bill_ID, SID),</b> <b>FOREIGNKEY (SID) REFERENCES (Student)</b>

### Application Constraints

- 1) While adding a new student in the system, default value for GPA will be 0.0
- 2) If there are no minimum and maximum credit requirements for any course then both the fields (min\_credit,max\_credit) will have same value. For example, to enroll in DBMS class, if only requirement is of min\_credit (3.0) , then both the fields min\_credit(3.0) and max\_credit(3.0) will have same value.
- 3) Each course will be uniquely identified by the combination of course\_id and department\_id field.
- 4) Prerequisites is a boolean variable for each course. If the value of this field is “Yes” then we will list all prerequisites courses from the “Pre\_req” entity.
- 5) For every enrollment we need to check whether the capacity of the class has reached or not. If yes, waitlist will be checked and based on the availability of the waitlist slots, the student will be placed in the waitlist.
- 6) Class End\_time will always be greater than class Start\_time.
- 7) Student can not enroll for credits greater than the permitted limit of max\_credit decided based upon his residency & level. Similarly, to maintain the student status a warning

message/notification action will be sent, if the enrolled credits are lesser than the min\_credit.

- 8) Enrollment\_enddate should be after enrollment\_start date.
- 9) Only admin can update/add the student's grade. Only admin can add/update course related information.
- 10) Student will be placed on the waitlist only if all the prereqs for that class are met, otherwise an informative message will be displayed showing why he can't be placed on waitlist.
- 11) Student can not enroll for two different classes at the same time & date (Schedule conflict).
- 12) Student can edit only his/her personal details but not other university specific details such as Student\_ID, level, residency classification, default password (same as student ID), initial billing amount first name and last name.
- 13) Billing rate will be calculated based on the level of the student (graduate or undergraduate) and not based on the level of the course.
- 14) When admin enters the student details in the database, by default the billing amount will be 0.0 and later it will be calculated based on the classes student enrolls in (depending on residency status).
- 15) Admin can not edit/view Student's password after the entry has been made in the database.
- 16) For special permission requests submitted by students, student's schedule will be updated (addition of course) only if admin approves the requests.
- 17) Admin will start cleaning of wait list only after the enrollment\_end date has passed.
- 18) Student can not enroll for courses once the enrollment\_end date has passed.