



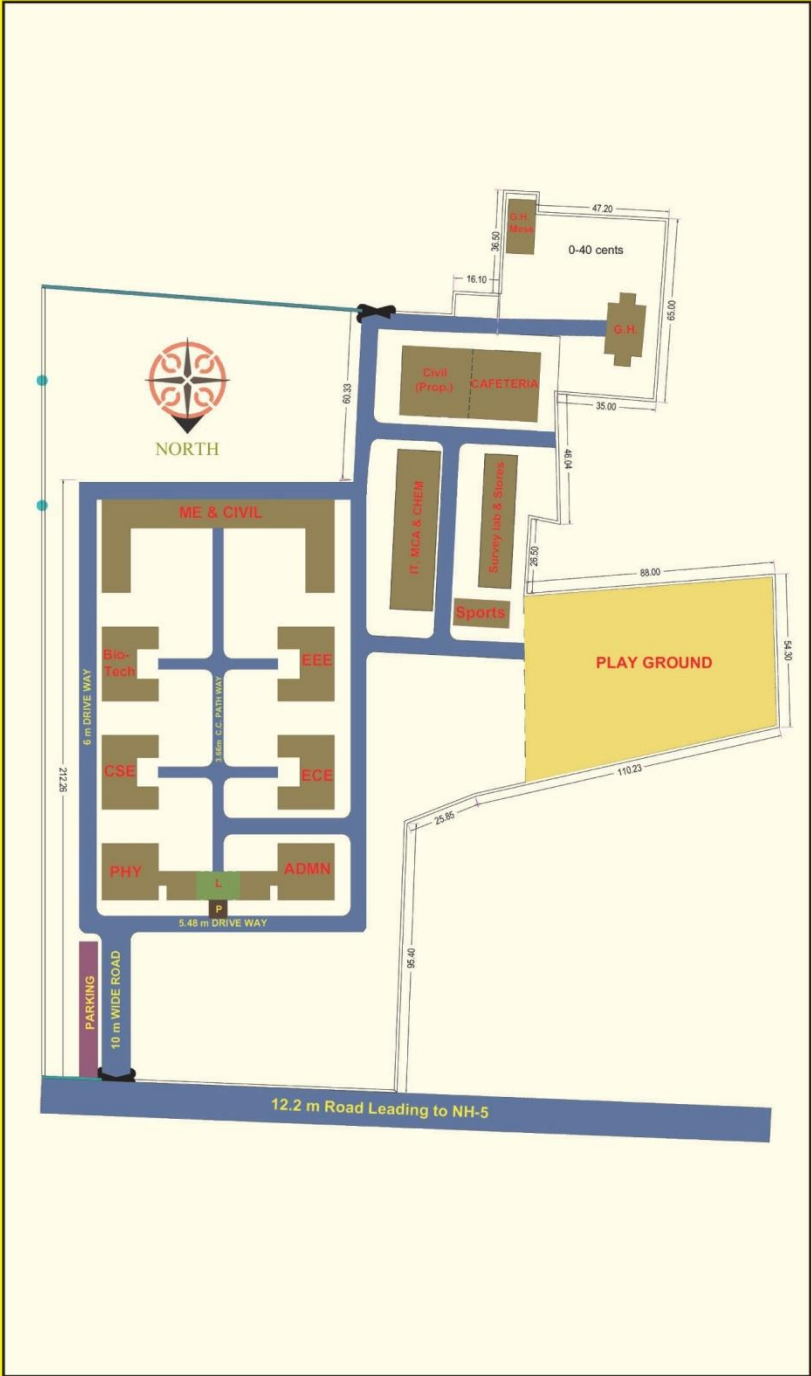
ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY AND SCIENCES (AUTONOMOUS)

(Affiliated to AU, Approved by AICTE & Accredited by NBA & NAAC with 'A'Grade)

PROSPECTUS & ACADEMIC REGULATIONS 2021-2022



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**ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY AND
SCIENCES (A)**

(UGC AUTONOMOUS)

**Approved by AICTE, Affiliated to Andhra University,
Accredited by N.B.A. & NAAC with 'A' Grade
(Estd : 2001)**



2021 - 22

Academic Regulations

Curriculum & Syllabi (First Year I&II Semesters)

DEPARTMENT OF CHEMICAL ENGINEERING



CONTENTS

1.	About the Society	1
2.	The Institute	1
3.	Anil Neerukonda Institute of Technology & Sciences	2
	Our Vision	2
	Our Mission	2
	Our Quality Policy	2
4.	Members of the Governing Body	2
5.	Members of Grievance & Redressal Committee	4
6.	Women Grievance & Redressal Committee	5
7.	Women Protection Cell	5
8.	Programs Offered	6
9.	About the Faculty	6
10.	Administration	6
11.	Infrastructure Facilities	7
11.1	Instructional Areas	7
11.2	Central Library	9
11.3	Laboratories	10
11.4	Computers, LAN & Internet	11
11.5	Student Amenities	11
12.	Academic Support Facilities	14
12.1	Proctorial System	14
12.2	Class Review Committees	14
12.3	Centralized Student Feedback	15
12.4	Faculty Quality improvement program	15
12.5	Remedial Classes	15
12.6	Value-Addition Courses	16
12.7	Internal Assessment	16
12.8	Scholarships	16
12.9	Gold Medals for Academic Excellence	16
13.	Extra-curricular & Co-curricular Activities	16
14.	Industry-Institute Interaction	17
15.	Training, Placement & Counseling	17
16.	Points of Pride	18
17.	Alumni Association	20
18.	Prohibition of Ragging	20
18.1	What Constitutes Ragging	20

18.2	Actions to be taken against students	21
18.3	Anti Ragging committee	22
19.	Rules of Conduct	23
20.	Attendance Rules	24
21.	Admission Procedure	25
22.	Fee Structure	26
23.	Professional Bodies in the College	27
24.	Academic Calendar for the year 2018-19	28
25.	Administration and Faculty	31

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY AND SCIENCES (AUTONOMOUS)

VISION...

ANITS envisages to emerge as a world-class technical institution whose products represent a good blend of technological excellence and the best of human values.

MISSION...

To train young men and women as competent and confident engineers with excellent communicational skills, to face the challenges of future technological changes, and also to impart holistic technical education using the best of infrastructure, outstanding technical and teaching expertise and an exemplary work culture, besides moulding them into good citizens.

QUALITY POLICY...

ANITS is engaged in imparting quality technical education. It constantly strives towards achieving high standards of teaching, training and development of human resources by encouraging its faculty and staff to work as a team and to update their knowledge and skills continually to match the needs of industry.

FOREWORD

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY AND SCIENCES (ANITS) was founded by Anil Neerukonda Educational Society (ANES) in the fond memory of Anil Neerukonda, son of Dr. B. R. Prasad Neerukonda.

Its humble journey started in 2001 with an intake of 220 students into four undergraduate B. Tech programmes. Within 14 years of its establishment, the institute registered phenomenal growth and is accredited by NAAC with 'A' Grade and by NBA for the second time. It is permanently affiliated to Andhra University and has achieved autonomous status in 2015. Further, the institute has been currently ranked as 4th among the private engineering colleges in Andhra Pradesh by APPSCHE. It has been recognised as "Centre for Excellence" by Infosys and is accorded by Andhra University as "Centre for Research".

Today, the institute offers seven B.Tech. Programmes and four M. Tech. Programmes with an annual total intake about 1170 students. The institute offers amenities like separate hostels for boys and girls, indoor and outdoor games, transport covering all the major locations of Visakhapatnam and medical aid provided by Anil Neerukonda hospital and NRI Institute of Medical Sciences, an other educational institution of ANES.

Apart from the State-of-the-Art laboratories, well established teaching methodology and implementation of the best practices, the wonderful co-ordination of the management, faculty & parents has so far played a crucial role in shaping the future of the ANITIANS and has been the talisman of the Institute's phenomenal growth.

The success stories of our champions at several qualifying exams for the higher studies like GRE, TOEFL, CAT, the impressive track record of the placements with highest known packages in MNCs like Google, Oracle, Infosys, TCS and so on are the sweetest fruits of our efforts.

PRAGNANAM BRAHMA, the motto of ANITS, is truly practiced by all the members of ANITS family, a direct effort to serve the society, nation and the mankind as well.

Hearty welcome to ANITS family.

Prof. T. V. Hanumantha Rao
PRINCIPAL

ACHIEVEMENT & HIGHLIGHTS

- ANITS has established “Institution’s Innovation Council(IIC)” as per the guidelines of MHRD Innovation cell, to develop the ecosystem required for entrepreneurship.
- ANITS has signed MOU with National Research Development Corporation (NRDC) India, to help students and faculty to apply and protect IPRs and convert their ideas to startup.
- Tatikella Abhishek (IV/IV CSE B Section) won the Virtusa National Neural Hack Challenge 2018 at Chennai.
- The ANITS students are selected for TCS “Code-Vita” season – VI World Finals (2018).
- Secured 3rd place in Top Engineering Colleges in Andhra Pradesh, survey by CSR – GHRDC 2017
- Secured 20th place in Ranking of Outstanding Engineering college of excellence by CSR – GHRDC 2017
- ANITS CSI Student Branch bagged the “Best Accredited Student Branch Award” by Computer Society of India during the academic year 2016-17 for the 5th time in Andhra Pradesh & Karnataka (Region-V).
- Students won various contests organized by reputed companies like TCS, Infosys ASPIRATIONS, TCS CODE VITA, ACM ICPC etc and brought laurels to the Institute.
- Secured 38th place in the Annual World Finals of ACM International Collegiate Programming Contest (ACM ICP 2014) sponsored by IBM and hosted by Ural Federal University (Russia) from 22nd to 26th June,2014.
- ‘AAA’ rating of ANITS by **Career 360** Magazine (May 2013)
- 'CSI Student Branch bagged 'Best Student Branch Award' consecutively for 3 years (2011-2014) in the entire Andhra Pradesh & Karnataka region (Region-V).

- Mr. Anudeep, former student of CSE branch (2010-14) secured a job in Google with a pay package of 1.44.crores + perks.
- Award of “Centre of Excellence” by Infosys Technologies Ltd during 2010-11.
- Extension of permanent affiliation by Andhra University
- Conferred Autonomous status
- Accredited by NAAC with ‘A’ Grade
- NBA reaccreditation to EEE, ECE, CSE, Mech., and IT courses.
- Recognition as ‘Research Centre’ and award of ‘Permanent Affiliation’ by Andhra University
- Recognition under 2(f) & 12(b) of the UGC act.
- Securing highest pass percentage among all the private affiliated colleges of the University.
- Good number of placements in reputed organizations.
- Quality publications by the faculty in Journals of repute with impact factor.
- ANITS has been recognized as Skill Development Centre (SDC) under Andhra Pradesh State Skills Development Corporation (APSSDC) (A State Government Organization)
- MOUs with about 18 organizations and accreditation by TCS, Infosys, Capgemini India (Hyderabad), Silver Partner of keane India L&T(ECC), Tech-Mahindra, Hyundai, BGR Energy, Zunik Energies, FMC Technologies etc., for campus recruitment.
- Students secured top positions at national level in Code-Vita contest organized by TCS and National Chamions in 'ASPIRATIONS organized by Infosys with IITs, NITs and other premium engineering colleges across the Nation and emerged as Winners.
- In-house development of software for student feedback, result analysis, attendance, web-site design etc.
- Top-Ten Most Preferred Colleges out of 700+ Private Engg. Colleges in the state of Andhra Pradesh (APSCHE bulletin).

CONTENTS

1. Department Profile
2. Vision & Mission of the Department
3. Program Educational Objectives
4. Program Outcomes & Program Specific Outcomes
5. Academic Regulations
6. Curriculum
7. First Year Syllabi (I-Sem & II-Sem)

Department Profile

The Department of **Chemical Engineering**, ANITS was started in the year 2012. The department offers B. Tech. Chemical Engineering with an intake of 60 students and reduced to 30 students from 2020-21. The department has 8 qualified faculty members who have their degrees from premier institutes like IISc, IITs, NITs, BITS Pilani and Andhra University and a few of them have more than 30 years of teaching and research experience in Chemical Engineering. The department is sanctioned with a UGC major research project for an amount of Rs. 13.39 lakhs in 2014. The department is offering consultancy to various industries in and around Visakhapatnam. The faculty members have expertise both in core Chemical Engineering, and interdisciplinary research in the areas of Computational Biology, Bio-process Engineering, Bio- fuels, Photo-Catalytic Degradation, Chemical Reaction Engineering, Process Simulation and Industrial Pollution Control. The faculty published research papers in national and international journals of high repute. The department is well equipped with laboratories worth 60 Lakhs in addition to major equipment like gas chromatography, UV spectrophotometer and bioreactor. The students are exposed to latest and innovative developments in Chemical Engineering as well as to co-curricular activities like attending workshops, seminars and presenting research papers in various conferences and seminars. Some of them have secured prizes in paper presentations, technical quiz etc. at reputed institutes like IIT Kharagpur, NIT Warangal and across India. The students undergo industrial internships in government and private organizations like HPCL, RINL, RIL, Dr. Reddys, IICT etc. The students got job opportunities in core and noncore industries with a package of 6 lakhs per annum.

DEPARTMENT OF CHEMICAL ENGINEERING

VISION

To emerge as centre of excellence in Chemical Engineering and attain global recognition in fulfilling the needs of industry and society.

MISSION

To train young and budding chemical engineers with quality education along with industry-academia interaction and to emerge as competent engineers for the society.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- PEO-1: To provide the students with academic training in basic sciences, chemical and its interdisciplinary fields for their successful career
- PEO-2: To acquaint students with industrial exposure and research to serve the industry and society.
- PEO-3: To inculcate good communication, entrepreneurship and leadership skills with ethical values empowering humanity for better society.

PROGRAM OUTCOMES (POS)

- PO-1: **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
- PO-2: **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
- PO-3: **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO-4: **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO-5: **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

- PO-6: **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
- PO-7: **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
- PO-8: **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
- PO-9: **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO-10: **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO-11: **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
- PO-12: **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOME (PSOs)

- PSO-1: The graduate will be competent in applying basic sciences & Chemical engineering principles to multi-disciplinary fields namely biotechnology, nanotechnology, environmental engineering and energy engineering.
- PSO-2: The graduate will be able to apply the technical knowledge to solve the problems of chemical, allied industries and society.

ACADEMIC REGULATIONS

ACADEMIC REGULATIONS FOR B.TECH PROGRAMME UNDER AUTONOMOUS STATUS

(W.E.F. THE ADMITTED BATCH OF 2020-21)

I. Admissions :

Admissions into first year of B.Tech. programme and admissions into second year (lateral entry) of B.Tech. programme of the Institute will be as per the norms stipulated by Andhra University & Andhra Pradesh State Council for Higher Education (APSCHE), Govt. of Andhra Pradesh. The academic regulations formulated will be applicable for the batch of students admitted in 2020-21 and in case of Lateral Entry admissions from 2021-22.

II. Programmes Offered:

The following are the B.Tech. Programmes offered by the Institute.

1. Chemical Engineering
2. Civil Engineering
3. Computer Science & Engineering
4. Electrical & Electronics Engineering
5. Electronics & Communication Engineering
6. Information Technology
7. Mechanical Engineering

III. Structure of the B. Tech. Programme:

The programme consists of Humanities, Basic Sciences, Engineering Sciences, Engineering and Technology courses. The complete programme is distributed over eight semesters with two semesters per academic year. Every branch of B.Tech programme will have a curriculum and syllabi for the courses recommended by the Board of Studies and approved by the Academic Council. The academic programmes of the Institute follow the credit system. The curriculum of B.Tech programme is designed to have a total of 160 credits of which a student should acquire all 160 credits to get the degree awarded and to determine the final CGPA. The lateral

entry students shall have a total of 122 credits of which one should acquire all 122 credits to get the degree awarded and to determine the final CGPA.

Different types of courses offered:

Apart from the Professional Core (PC), Basic Sciences (BS), Humanities and Social Sciences (HS), Engineering Sciences (ES) and project (PR), various other courses are offered in the programme as mentioned below.

Open Elective (OE) category:

Under this category electives from other technical and / or emerging subjects / inter disciplinary subjects / MOOCs are offered.

Open elective is a course offered by any department other than home department and the student has to choose elective offered by other departments as and when offered by the department.

To make the students abreast with the latest technological developments, the departments also offer emerging subjects in the curriculum.

The student can register for MOOCs course as per the curriculum designed and as and when scheduled by the department. However, its grade will be accorded by a duly constituted departmental committee.

Professional Elective category (PE):

Professional elective is a specialized course offered by the department. The student has to register for professional electives as offered by the department during the programme as per his choice and as provided in the curriculum.

Mandatory Non Credit Courses

In order to enhance the life skills of the students and acquaint them with general awareness in multi disciplinary fields, mandatory non credit courses were designed which will have student engagement with faculty but does not carry any credits. Induction programme, courses such as Human values & Professional Ethics,

Environmental Studies etc., are categorized as Mandatory non-credit courses.

For the award of the degree, the student has to secure a minimum pass grade or above in all the mandatory courses, registered open electives, MOOCs, registered professional electives.

IV. Duration of the Programme:

The duration of the programme is four academic years consisting of two semesters in each academic year. A student is permitted to complete the programme in a stipulated time frame of 8 consecutive academic years from the date of initial admission. Students joining the programme in the 2nd year through lateral entry scheme shall have to complete the programme in a stipulated time frame of 6 consecutive academic years from the date of initial admission.

V. Medium of Instruction:

The medium of instruction and examination is in English.

VI. Minimum Instruction Days:

Each semester normally consists of a minimum of 90 working days.

VII. Academic Calendar:

The dates of all important events, such as commencement of class work, examinations, vacations, etc., during the academic year will be specified in the Academic Calendar of the Institute.

VIII. Examinations & Evaluation Process:

The performance of a student in each semester shall be evaluated subject-wise with a maximum of 100 marks each for theory and practical/ drawing subjects.

(A) Theory Course:

For all lecture based theory courses, the assessment shall be for 40 marks through internal evaluation and 60 marks through external semester-end examination.

i) Internal evaluation:

The sessional marks shall be awarded through internal evaluation by the teachers concerned based on the continuous assessment which includes class tests, quiz, viva-voce, assignments, student regularity, two mid-examinations etc., according to a scheme notified by the department at the beginning of the semester.

Out of the 40 internal evaluation marks, 20 marks are assigned for 2 internal-mid exams, 10 marks for assignments, 5 marks for projects/ case studies /quiz/tests and 5 marks for attendance. The weighted average of 2 internal-mid exams is considered for the 20 marks allocated.

Under any circumstances, no re-examination shall be conducted for the internal mid examinations.

ii) External evaluation:

The question paper shall be set externally and the answer scripts are valued through a double valuation system.

The average of the two valuations will be taken for the award of marks. In case, the difference of the marks obtained in the two valuations is more than 20%, then a third examiner shall value the script. Out of the three valuations, the average of marks obtained in third valuation and the marks obtained nearer to third valuation out of first two valuations shall be considered. No revaluation for any subject/course shall be entertained as already double valuation system is in existence. However, recounting is allowed on the request of the candidate on payment of specified fee. Challenge valuation shall also be entertained within a stipulated period set by examination section on payment of specified fee.

(B) Laboratory Course:

Each student will perform about 10 to 12 experiments in each laboratory course. Laboratory course will be evaluated for 100 marks, out of which 50 marks are for external examination and 50 marks are for internal evaluation. The internal marks are awarded based on continuous assessment (RUBRICS MODEL), internal lab examination and student regularity. The external examination will be conducted by two examiners, one of them being laboratory class teacher as internal examiner (nominated by the Principal on recommendation of HOD) and an external examiner nominated by the Principal from the panel of experts recommended by the HOD.

A candidate shall be declared to have passed any theory subject/ course if he/she secures not less than 40% in external theory examination and also a minimum of 40% of total marks of that course which assures a minimum of 'P' grade.

A candidate shall be declared to have passed any practical course if he/she secures not less than 50% in external laboratory examination and also a minimum of 50% of total marks of that course which assures a minimum of 'C' grade.

In case of subjects evaluated through internal assessment such as QA-I & II, verbal aptitude, soft skills etc., if a candidate fails, he/she is given an opportunity to improve to pass grade

(P) irrespective of the score he gets over and above pass mark in the re-examination within one month on payment of special examination fee. If he fails in the re-examination, he has to appear for the exam in the consecutive semester/ year along with the subsequent batches.

Any student appearing for the semester-end practical examination is eligible only if he/she submits the bonafide record certified by the laboratory class teacher and the HOD.

(C) Project Work:

The project work is evaluated through internal assessment in the IV Year I semester through continuous assessment process and a final evaluation by a committee nominated by the HOD. In IV year II semester, the assessment process consists of both internal and external evaluation. The internal evaluation will be done through continuous assessment process and the external evaluation will be done by a duly constituted committee consisting of at least one external expert nominated by the Principal. If a student fails in the fourth year first semester project, he has to appear for re-assessment within one month for which he has to pay the re-examination fee if any.

(D) Industrial Training:

The industrial training is assessed internally for 100 marks by an internal evaluation committee constituted by the HOD.

(E) Supplementary Exam:

The supplementary examinations will be conducted after the completion of the regular examination of the corresponding semester.

IX. Attendance Regulations:

Attendance of a student is computed by considering total number of periods conducted in all courses as the denominator and the total number of periods actually attended by the student in all courses, as the numerator. It is desirable for a student to put in 100% attendance in all the subjects. However, a candidate shall be permitted to appear for the semester end examination provided he maintains a minimum of 75% overall attendance in the semester.

The shortage of attendance on medical grounds can be condoned up to a maximum of 9% provided the student puts in at least 66% attendance and provided the Principal is satisfied with the genuineness of the reasons. The Medical Certificates are to be submitted to the Head of the Department when the candidate reports to the classes immediately after the absence. Medical certificates submitted after finalization of attendance shall not be entertained. Condonation fee as fixed by the institute for those who put in attendance greater than 66% and less than 75% shall be charged before the semester-end examinations.

In the case of students who participate in co-curricular, extra-curricular activities like student seminars, N.S.S, N.C.C, Inter-collegiate tournaments and any such other activities involving the representation of the Institute, with the prior approval of the Principal, the candidate may be deemed to have attended the classes during the actual period of such activity, solely for the purpose of attendance.

A student, who could not satisfy the minimum attendance requirement of 66% in any semester, shall be declared 'Detained'. He is not eligible to appear for the semester end examinations.

He will not be promoted to the next semester and shall have to repeat that semester with the next batch(es) of students. Such students who are detained and seek readmission, should submit an undertaking/a declaration that they will abide by the regulations existing at the time of readmission.

X. Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in Item No. IX.

A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory subject if only he secures not less than 40% marks in the semester-end examination and a minimum of 40% marks in the sum of the internal evaluation and semester-end examination taken together. In the labs/ projects, the student should secure a minimum of 50% marks in the external examination and a minimum of 50% marks in the sum of internal evaluation and external examination evaluation taken together.

Further, a candidate has to secure a minimum of 40 % in theory examination (excluding sessional marks) and a minimum of 50 % (excluding sessional marks) in the Practical Examination / Project / Field Work / Viva Voce / Industrial Training in Semester –End / Year

– End Examination and 50% aggregate to pass.

A student will be promoted to the next semester, if only he satisfies the minimum attendance requirement. Further the student should also satisfy minimum credit requirement to be promoted to III Year or to IV year as per the norms given below.

A student shall be promoted from II Year to III Year only if he fulfills the academic requirement of total 40 % of all credits from regular and supplementary examinations of I Year and II Year – I Semester {i.e., total 3 semesters} examinations, irrespective of whether the candidate takes the examination in all the subjects or not.

A student shall be promoted from III Year to IV Year only if he fulfills the academic requirements of total 40% of credits from regular and supplementary examinations of I Year, II Year and III Year- I Semester {i.e., total 5 semesters}, irrespective of whether the candidate takes the examinations in all the subjects or not.

For lateral entry students, there is no credit based restriction for promotion from II year to III year. But a lateral entry student shall be promoted from III year to IV year only if he fulfills the academic requirements of total 40% of credits from regular and supplementary examinations of II year and III year- I Semester {i.e., total 3 semesters} irrespective of whether the candidate takes the examinations in all the subjects or not.

Students, who fail to complete their B.Tech. Programme within eight academic years from the year of their admission or fail to acquire the credits stipulated for the programme shall forfeit their seat in B.Tech. Programme and their admission shall stand cancelled. For lateral entry students they have to complete the programme in six years from their year of admission.

XI. Award of Grades:

The absolute grading system is adopted as follows:

S.No	Range of marks %		Grade	Grade Points	Remarks
1	> 90	< 100	O	10	Out Standing
2	> 80	< 90	A+	9	Excellent
3	> 70	< 80	A	8	Very Good
4	> 60	< 70	B+	7	Good
5	> 55	< 60	B	6	Above Average
6	> 50	< 55	C	5	Average
7	> 40	< 50	P	4	Pass
8		< 40	F	0	Fail
9			I	0	Ab (Absent)

Note: Minimum grade to pass in a laboratory course is ‘C’.

The performance of a student at the end of each semester is indicated in terms of Semester Grade Point Average (SGPA). The SGPA is calculated as below:

$$\text{SGPA} = \frac{\sum(\text{credits of a course} \times \text{grade points awarded for a course})}{\sum(\text{Credits of a course})}$$

SGPA is calculated for the candidates who have passed in all the courses in that semester.

Cumulative Grade Point Average (CGPA) will be calculated from II semester onwards up to the final semester and its calculation is similar to that of SGPA, considering all the courses offered from the first semester onwards.

CGPA is calculated for those who clear all the courses including present semester.

XII. Award of Class:

For award of class, all 160 credits are considered in case of four year programme and 122 credits in case of lateral entry admitted students. A candidate, who becomes eligible for the award of B.Tech., degree, shall be placed in one of the following classes.

S.No.	Class	CGP A
1	First Class with Distinction	7.0 or more*
2	First Class	6.0 or more
3	Second Class/Pass	5.0 or more but less than 6.0

***First class with Distinction will be awarded only to those students who clear all the subjects of the program in first attempt of regular examinations.**

The CGPA can be converted to aggregate percentage by multiplying CGPA with 10, in case of requirement by any other university or for any other purpose.

XIII. Eligibility for Award of B.Tech. Degree:

A student shall be eligible for the award of the B.Tech degree if he fulfills all the following conditions :

- 1) Registered and successfully completed all the components prescribed for eligibility in the Programme of study to which he is admitted within the stipulated period,
- 2) Obtained CGPA greater than or equal to 5.0 (Minimum requirement for Pass),
- 3) No disciplinary action is pending against him and
- 4) Has no dues to the Institute including hostels.

XIV. Malpractices:

The Controller of Examinations/Dean of Examinations shall refer the cases of suspected malpractices in mid examinations and semester-end examinations to Malpractice Enquiry Committee constituted by the Institute. Such committee shall follow the approved scales of punishment. The Principal shall take necessary action against the erring students based on the recommendations of the committee.

XV. Transitory Regulations

1. The student who is detained, on re-admission has to continue the course work along with the regular students of the respective semester in which the student gets re-admission.
2. The student shall be required to do all the courses in the curriculum prescribed for the batch of students in which the student joins subsequently.
3. The student has to register for pre-requisite / substitute / Compulsory subjects offered in place of subjects already studied earlier. However, exemption will be given to those candidates who have already passed such courses in the earlier semester(s) he was originally admitted into and substitute subjects are offered in place of them as decided by the Board of Studies.

4. The mode of internal evaluation and end-semester examinations shall be on par with the regular students, i.e., the student has to follow the then mode of internal evaluation and the then question paper model for the end-semester examinations along with the regular students of the respective semester in which the student gets re-admission. The marks secured in the internal and end-semester examinations will be pro-rated in accordance with the regulations under which the student was first admitted.
5. For the subjects studied under earlier regulations but failed, the student has to appear, pass and acquire credits from the supplementary examinations as and when conducted. The question paper model shall remain same as one in which the student took examination during earlier regulations.
6. The promotion criteria based on attendance as well as credits shall be in accordance with the regulations under which the student was first admitted.
7. The decision of the Board of Studies will be final on any other clarification in this regard.

XVI. Amendments to Regulations:

The Institute may, from time to time, revise, amend, or change the Regulations, Schemes of Examinations, and / or Syllabi and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the Institute.

XVII. General:

- (i) **Where the words ‘he’, ‘him’, ‘his’, occur in the regulations, they include ‘she’, ‘her’, ‘hers’.**
- (ii) **The academic regulation should be read as a whole for the purpose of any interpretation.**
- (iii) **In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.**

CURRICULUM



**ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
(UGC AUTONOMOUS)**

(Affiliated to AU, Approved by AICTE & Accredited by NBA & NAAC with 'A' Grade)
Sangivalasa 531 162, Bheemunipatnam Mandal, Visakhapatnam Dist

DEPARTMENT OF CHEMICAL ENGINEERING

R-20 regulations w.e.f 2020-21 admitted batch

I-Year I-Semester												
Code	Title of the Course	Category	L	T	P	E	O	Total	Max. marks		Total Marks	Credits
									Sess.	End. Exam		
CHE111	Engineering Mathematics-I	BS	3	0	0	1	6	10	40	60	100	3
CHE112	Engineering Physics	BS	3	0	0	1	4	8	40	60	100	3
CHE113	Engineering Chemistry	BS	3	0	0	1	4	8	40	60	100	3
CHE114	Introduction to Chemical Engineering	PC	3	0	0	1	4	8	40	60	100	3
CHE115	Engineering Drawing	ES	2	0	3	1	4	10	40	60	100	3.5
CHE116	Engineering Physics Lab	BS	0	0	3	0	1	4	50	50	100	1.5
CHE117	Engineering Chemistry Lab	BS	0	0	3	0	1	4	50	50	100	1.5
CHE118	Engineering Workshop	ES	0	0	3	0	1	4	50	50	100	1.5
CHE119	Human Values and Professional Ethics (Mandatory non-credit course)	MC	3	0	0	0	1	4	50	0	50	--
	Total		17	0	12	5	26	60	400	450	850	20
I-Year II-Semester												
CHE121	Engineering Mathematics - II	BS	3	0	0	1	6	10	40	60	100	3
CHE122	Communicative English	HS	3	0	0	1	4	8	40	60	100	3
CHE123	Basic Mechanical Engineering	ES	3	0	0	1	5	9	40	60	100	3
CHE124	Basic Electrical and Electronics Engineering	ES	3	0	0	1	5	9	40	60	100	3
CHE125	Problem solving with C	ES	3	0	0	1	6	10	40	60	100	3
CHE126	English Language Lab	HS	0	0	3	0	1	4	50	50	100	1.5
CHE127	Problem solving with C Lab	ES	0	0	3	0	3	6	50	50	100	1.5
CHE128	Environmental Science (Mandatory non-credit course)	MC	3	0	0	0	1	4	50	0	50	--
	Total		18	0	6	5	31	60	350	400	750	18

II-Year I-Semester												
Code	Name of the Course	Category	L	T	P	E	O	Total	Max. marks		Total Marks	Credits
									Sess.	End. Exam		
CHE211	Engineering Mathematics - III	BS	3	0	0	1	6	10	40	60	100	3
CHE212	Organic Chemistry	BS	3	0	0	1	5	9	40	60	100	3
CHE213	Biology for Engineers	ES	2	0	0	1	4	7	100	--	100	2
CHE214	Chemical Process Calculations	PC	3	0	0	1	6	10	40	60	100	3
CHE215	Mechanical Operations	PC	3	0	0	1	6	10	40	60	100	3
CHE216	Organic Chemistry Lab	BS	0	0	3	0	1	4	50	50	100	1.5
CHE217	Mechanical Operations Lab	PC	0	0	3	0	1	4	50	50	100	1.5
	Total		14	0	6	5	29	54	360	340	700	17
II-Year II-Semester												
Code	Name of the Course	Category	L	T	P	E	O	Total	Max. marks		Total Marks	Credits
									Sess.	End. Exam		
CHE221	Engineering Mathematics - IV	BS	3	0	0	1	6	10	40	60	100	3
CHE222	Humanities Elective	HS	3	0	0	1	3	7	40	60	100	3
CHE223	Engineering Thermodynamics	EC	3	0	0	1	5	9	40	60	100	3
CHE224	Momentum Transfer	PC	3	0	0	1	6	10	40	60	100	3
CHE225	Numerical Methods for Chemical Engineers	SC	3	0	0	1	5	9	40	60	100	3
CHE226	Professional Elective - I	PE	3	0	0	1	3	7	40	60	100	3
CHE227	Momentum Transfer Lab	PC	0	0	3	0	1	4	50	50	100	1.5
CHE228	Computational Lab	SC	0	0	3	0	1	4	50	50	100	1.5
CHE229	Seminars	SC	0	0	2	0	1	3	100	---	100	1
	Total		18	0	8	6	31	63	440	460	900	22

III-Year I-Semester												
Code	Name of the Course	Category	L	T	P	E	O	Total	Max. marks		Total Marks	Credits
									Sess.	End. Exam		
CHE311	Open Elective - I	OE	3	0	0	1	2	6	40	60	100	3
CHE312	Chemical Engineering Thermodynamics	PC	3	0	0	1	4	8	40	60	100	3
CHE313	Heat Transfer	PC	3	0	0	1	4	8	40	60	100	3
CHE314	Mass Transfer - I	PC	3	0	0	1	4	8	40	60	100	3
CHE315	Chemical Technology	PC	3	0	0	1	4	8	40	60	100	3
CHE316	Professional Elective - II	PE	3	0	0	1	3	7	40	60	100	3
CHE317	Heat Transfer Lab	PC	0	0	3	0	1	4	50	50	100	1.5
CHE318	Chemical Technology Lab	PC	0	0	3	0	1	4	50	50	100	1.5
CHE319	Quantitative and Verbal Aptitude - I	HS	0	0	3	1	3	7	100	--	100	1.5
CHE310	Summer Internship - I	PR	0	0	0	0	0	0	100	--	100	2
	Total		18	0	9	7	26	60	540	460	1000	24.5
III-Year II-Semester												
Code	Name of the Course	Category	L	T	P	E	O	Total	Max. marks		Total Marks	Credits
									Sess.	End. Exam		
CHE321	Open Elective - II	OE	3	0	0	1	2	6	40	60	100	3
CHE322	Mass Transfer - II	PC	3	0	0	1	4	8	40	60	100	3
CHE323	Chemical Reaction Engineering - I	PC	3	0	0	1	4	8	40	60	100	3
CHE324	Process Dynamics and Control	PC	3	0	0	1	4	8	40	60	100	3
CHE325	Professional Elective - III	PE	3	0	0	1	3	7	40	60	100	3
CHE326	Professional Elective - IV	PE	3	0	0	1	3	7	40	60	100	3
CHE327	Mass Transfer Lab	PC	0	0	3	0	1	4	50	50	100	1.5
CHE328	Process Dynamics and Control Lab	PC	0	0	3	0	1	4	50	50	100	1.5
CHE329	Quantitative Aptitude - II & Soft Skills	HS	0	0	3	2	3	8	100	--	100	1.5
	Total		18	0	9	8	25	60	440	460	900	22.5

IV-Year I-Semester												
Code	Name of the Course	Category	L	T	P	E	O	Total	Max. marks		Total Marks	Credits
									Sess.	End. Exam		
CHE411	Open Elective - III	OE	3	0	0	1	2	6	40	60	100	3
CHE412	Chemical Reaction Engineering - II	PC	3	0	0	1	5	9	40	60	100	3
CHE413	Transport Phenomena	PC	3	0	0	1	6	10	40	60	100	3
CHE414	Chemical Process Economics and Equipment Design	PC	3	0	0	1	6	10	40	60	100	3
CHE415	Process Modeling and Simulation	SC	3	0	0	1	5	9	40	60	100	3
CHE416	Professional Elective-V	PE	3	0	0	1	3	6	40	60	100	3
CHE417	Chemical Reaction Engineering Lab	PC	0	0	3	0	1	4	50	50	100	1.5
CHE418	Process Modeling and Simulation Lab	SC	0	0	3	0	1	4	50	50	100	1.5
CHE419	Project Phase - I	PR	0	0	3	0	3	6	100	--	100	2
CHE410	Summer Internship-II	PR	0	0	0	0	1	1	100	--	100	2
	Total		18	0	9	6	33	66	540	460	1000	25
IV-Year II-Semester												
Code	Name of the Course	Category	L	T	P	E	O	Total	Max. marks		Total Marks	Credits
									Sess.	End. Exam		
CHE421	Open Elective - IV (MOOCS)	OE	0	0	0	0	3	3	100	--	100	3
CHE422	Project Phase - II	PR	0	0	9	0	9	18	100	100	200	8
	Total		0	0	9	0	12	21	200	100	300	11

B. Tech. (Hons) in Chemical Engineering (Total Credits: 180)

20 additional credits are to be acquired for Honors.

Of the 20 additional credits to be acquired, 16 credits shall be earned by undergoing specified courses listed as pools with four courses each carrying 4 credits. The remaining 4 credits must be acquired through MOOCs, which shall be domain specific, each with 2 credits and with minimum duration of /12 weeks as recommended by board of studies.

The courses that are offered for B.Tech. (Hons) in Chemical Engineering are

Pool 1: Advanced Chemical Engineering												
Code	Name of the Course	Category	L	T	P	E	O	Total	Max. marks		Total Marks	Credits
									Sess.	End. Exam		
CHE 611 H	Advanced heat transfer	PC	3	1	0	1	2	7	40	60	100	4
CHE 612 H	Advanced separation technology	PC	3	1	0	1	2	7	40	60	100	4
CHE 613 H	Advanced reaction engineering	PC	3	1	0	1	2	7	40	60	100	4
CHE 614 H	Advanced process control	PC	3	1	0	1	2	7	40	60	100	4
	MOOCs - I	OE	0	0	0	0	3	3	100	--	100	2
	MOOCs - II	OE	0	0	0	0	3	3	100	--	100	2

Pool 2: Pharmaceutical Technology												
Code	Name of the Course	Category	L	T	P	E	O	Total	Max. marks		Total Marks	Credits
									Sess.	End. Exam		
CHE 621 H	Pharmaceutical Technology	PC	3	1	0	1	2	7	40	60	100	4
CHE 622 H	Pharmaceutical Kinetics	PC	3	1	0	1	2	7	40	60	100	4
CHE 623 H	Pharmaceutical Analysis	PC	3	1	0	1	2	7	40	60	100	4
CHE 624 H	Pharmaceutical Biotechnology	PC	3	1	0	1	2	7	40	60	100	4
	MOOCs - I	OE	0	0	0	0	3	3	100	--	100	2
	MOOCs - II	OE	0	0	0	0	3	3	100	--	100	2

Pool 3: Biochemical Engineering

Code	Name of the Course	Category	L	T	P	E	O	Total	Max. marks		Total Marks	Credits
									Sess.	End. Exam		
CHE 631 H	Biochemistry and Microbiology	PC	3	1	0	1	2	7	40	60	100	4
CHE 632 H	Bioprocess Engineering	PC	3	1	0	1	2	7	40	60	100	4
CHE 633 H	Bio Separation Technology	PC	3	1	0	1	2	7	40	60	100	4
CHE 634 H	Bio Analytical Techniques	PC	3	1	0	1	2	7	40	60	100	4
	MOOCs - I	OE	0	0	0	0	3	3	100	--	100	2
	MOOCs - II	OE	0	0	0	0	3	3	100	--	100	2

Pool 4: Industrial Safety

Code	Name of the Course	Category	L	T	P	E	O	Total	Max. marks		Total Marks	Credits
									Sess.	End. Exam		
CHE 641 H	Principles of Safety Management	PC	3	1	0	1	2	7	40	60	100	4
CHE 642 H	Chemical Process Safety	PC	3	1	0	1	2	7	40	60	100	4
CHE 643 H	Environmental Issues and Management	PC	3	1	0	1	2	7	40	60	100	4
CHE 644 H	Hazard Identification and Risk Assessment	PC	3	1	0	1	2	7	40	60	100	4
	MOOCs - I	OE	0	0	0	0	3	3	100	--	100	2
	MOOCs - II	OE	0	0	0	0	3	3	100	--	100	2

MINOR REQUIREMENTS IN CHEMICAL ENGINEERING

Total Credit requirement: 20

16 Credits shall be earned by selecting any four courses from the following and 4 credits through MOOCs with two courses of minimum 8 weeks duration.

Minors												
Code	Name of the Course	Category	L	T	P	E	O	Total	Max. marks		Total Marks	Credits
									Sess.	End. Exam		
CHE 511M	Chemical Process Calculation	PC	3	1	0	1	2	7	40	60	100	4
CHE 512 M	Particle Technology	PC	3	1	0	1	2	7	40	60	100	4
CHE 513 M	Momentum Transfer	PC	3	1	0	1	2	7	40	60	100	4
CHE 514 M	Heat Transfer	PC	3	1	0	1	2	7	40	60	100	4
CHE 515 M	Separation Technology	PC	3	1	0	1	2	7	40	60	100	4
CHE 516 M	Chemical Reaction Engineering	PC	3	1	0	1	2	7	40	60	100	4
	MOOCS - I	OE	0	0	0	0	3	3	100	--	100	2
	MOOCS - II	OE	0	0	0	0	3	3	100	--	100	2