



GNSS Courses by CSSTEAP - An Update

Dr. Rajat Acharya

Indian Space Research Organization (ISRO)

10.12.19

ICG-14, Bengaluru

Background

- GNSS has a major influence on the development of nations
- Ease of civilian life, precision in scientific applications, new dimensions in research, modernizations in industries
- Boosting the economy up
- Essential to build capacity in use of GNSS related technologies
- Ensure a prepared workforce for the growing opportunities in this sector

Background

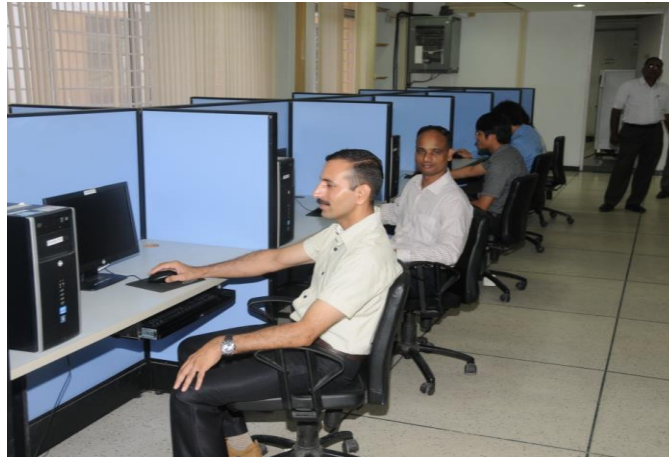
- UN-OOSA identified India as host country for establishing CSSTEAP and the Centre was established in November, 1995
- Hosted by Government of India with Department of Space as nodal agency.
- CSSTEAP resolution made it responsible for capacity building
- Commitment is embodied in the Indian sloka, “ज्ञानं दानात् वृध्यते”
- Made substantial progress in furthering knowledge and experience of space applications in the region

GNSS Course

- Classes on Navigation since beginning of this century
- Started full term course from 2015: 9-month duration
- Conducted by Space Applications Centre, ISRO, Ahmedabad

Course	Year	Participants	Countries
GNSS-01	2015-2016	09	04
GNSS-02	2017-2018	12	05
GNSS-03	2019-2020	15	08

GNSS Courses by CSSTEAP - An Update



Objectives

- Two fold objectives
 - *Technical* : Understand and utilize the benefits of GNSS technologies and spread their applications for the benefit of the nations
 - *Cooperative level*: Exchange information and knowledge and facilitate collaboration amongst participants

1. Designing the course:

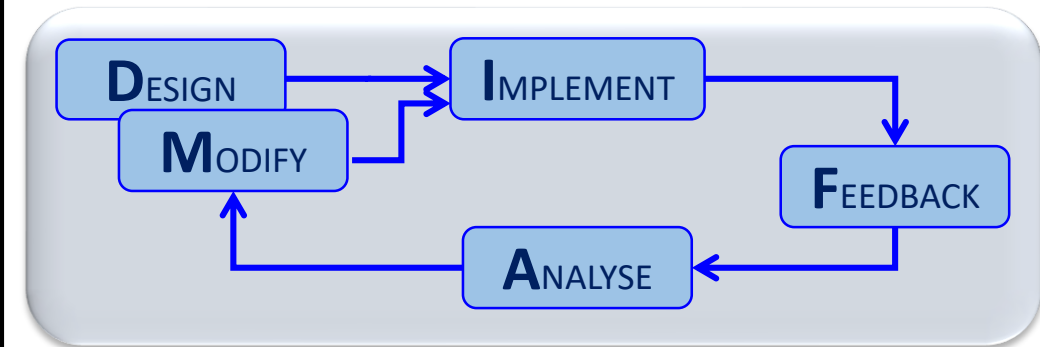
Academic Content

- Course structure considering state of the art technology and effective societal usage
- Boost the usage capacity and applications

Implementation Approach

- Creating Cohesiveness

Recurrent adaptive method

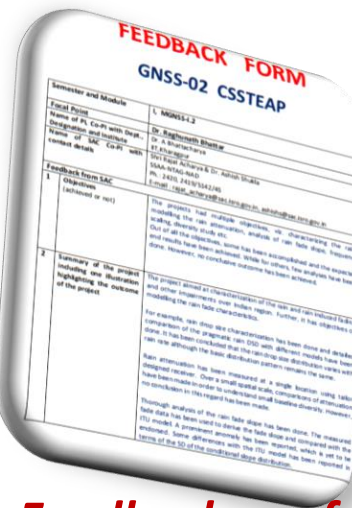


Amendments

- Changes driven by past experience and feedback
- Three major elements factored the changes incorporated



**ICG observations /
recommendations**



**Feedback from
previous course**



**Recent Technological
developments**

1. Designing the course: Syllabus

- Curriculum based on guidelines provided by the UN
- BoS suggest modifications, within the frame work of initial recommendation

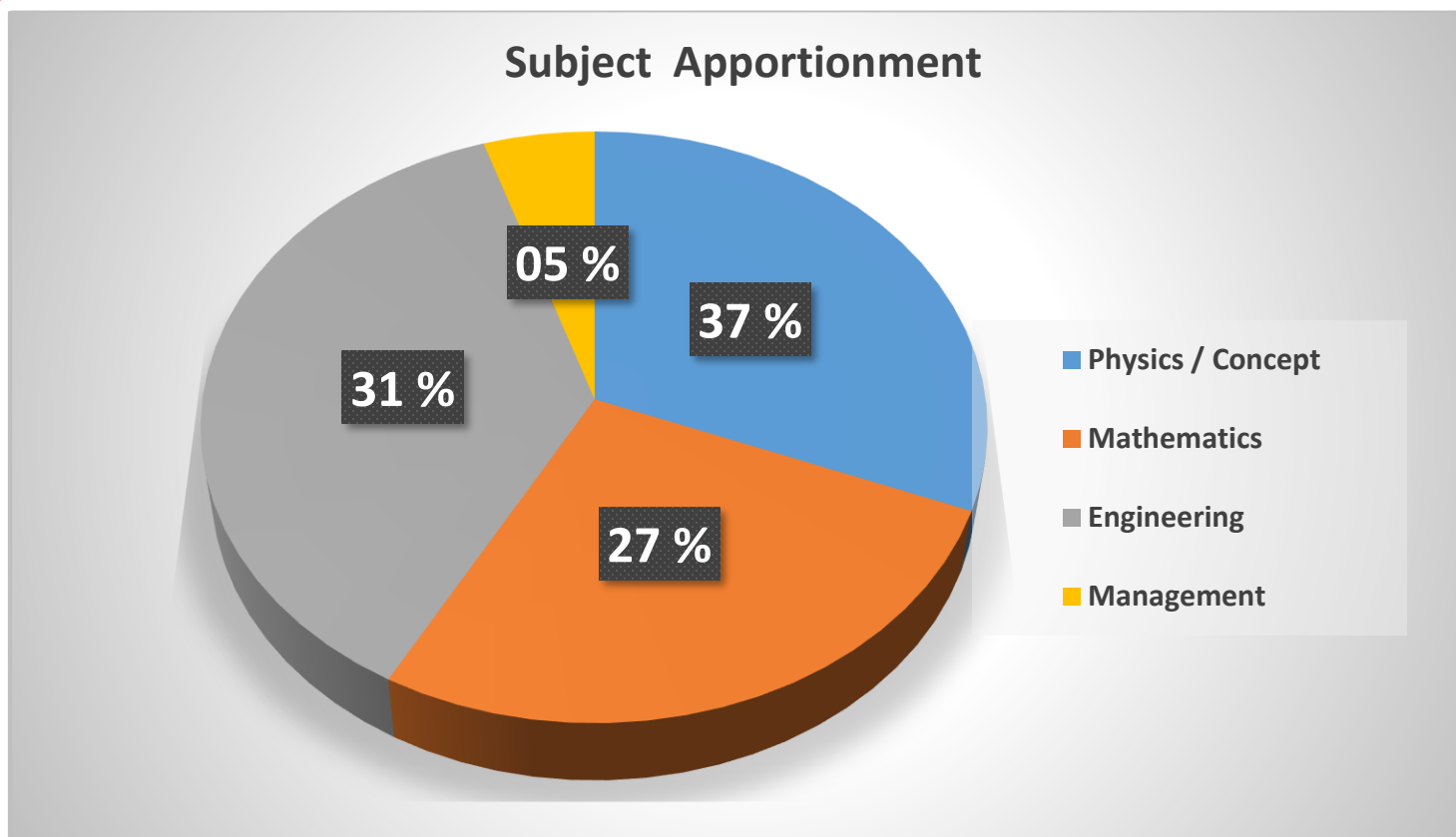
Paper/Module Name
Foundation Course
Fundamentals of NAVCOM
GNSS Signals and Systems
GNSS Receivers
Position Determination Techniques

Paper/Module Name
Advanced GNSS Receivers and Augmentation systems
GNSS/INS Integrated Navigation
GNSS Applications
Space Weather and GNSS

Syllabus: Changes introduced

- Extensive foundation course
- SATCOM and DSP basics enhanced
- Topics on advanced receivers introduced
- New and novel applications introduced
- Increased interactive session
- Increased practical laboratory sessions for some modules

Apportionment



Syllabus: Special Focus on Space Weather

Space weather is critical to GNSS

Causes considerable perturbation to the equatorial ionosphere

Further we are very dependent on space-based technology

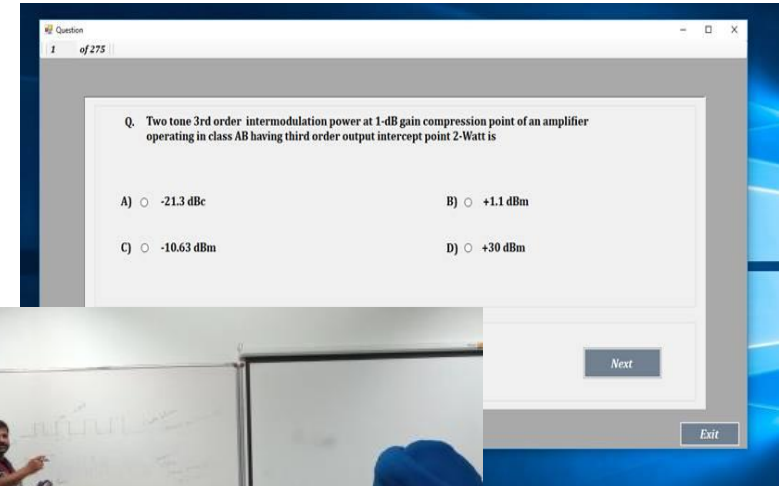
- Introduce
- Aware
- Technical knowledge dissemination
- Programs and projects

2. Implementation:

- Theory and experiment goes vis-à-vis
- Group Seminar on common topic of importance
- Project problem relevant to student's own organization
- Lecturers selected from most experienced resources of SAC and premier academic institutions across India
- Increased Academia & Industry participation

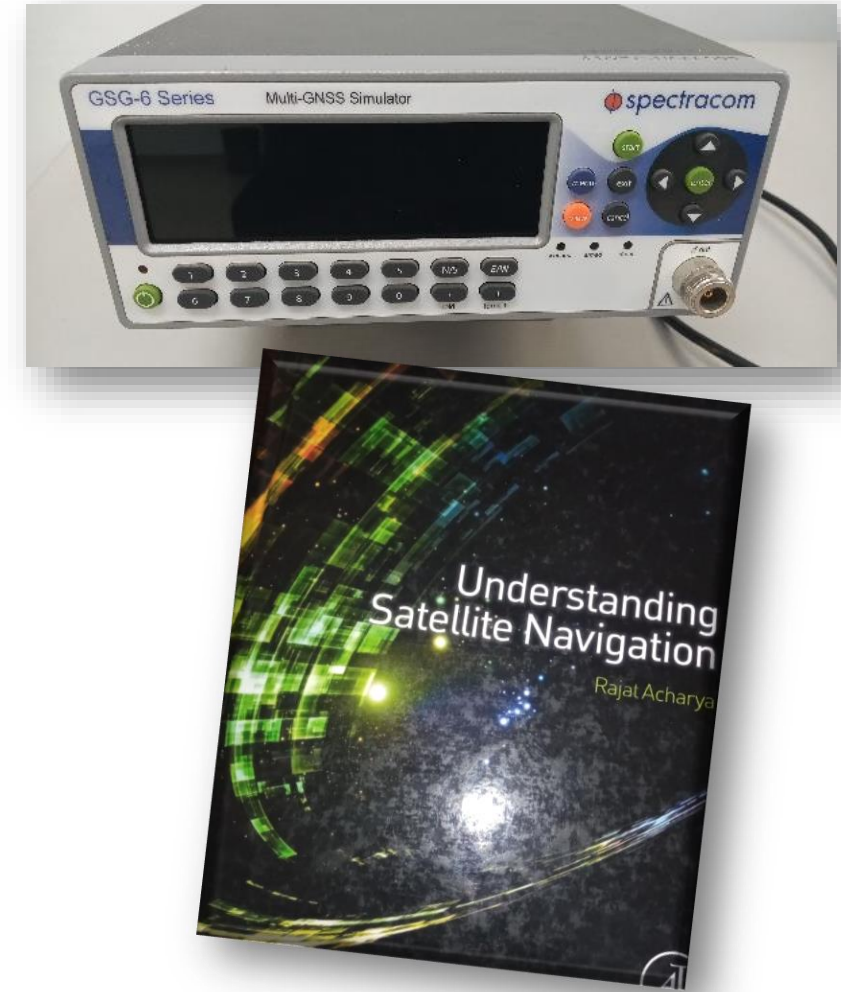
2. Implementation: *What's New?*

- ❑ Separate library for CSSTEAP-GNSS students
- ❑ Online quiz from question bank and real time assessment
- ❑ Student's Day
- ❑ Participation in National conferences with sessions on GNSS



2. Implementation: - *CSSTEAP Efforts*

- CSSTEAP Compilation of GNSS lectures
- Educational SW tools developed by CSSTEAP faculties
- GNSS Simulator procured by CSSTEAP
- GNSS books by CSSTEAP faculties



3. Feedback : Positives

- Participants' feedback is analysed
- Overall response: Course content is good and useful to their work
- Experienced faculties, effective Tutorial sessions were appreciated
- Students day, in-house library are very much beneficial

3. Feedback : Negatives

- Few participants felt course syllabus theoretically intensive :
Alterations made in the course
- Definite mechanism for feedback after the course ends is absent
- Hinders sustainability of the cooperation process

4. Analysis: Shortcoming

- Lack of internetworking platform for participants
- Cohesion created amongst the participating candidates/ countries, remains unutilized

Suggested Actions

- CSSTEAP-GNSS participants meeting during each course
- Deliberating on support for data and information sharing
- Deliberating on keeping one full week of the course tailored on the basis of student's requirement at their work.

Encouraging news

- Trained Individual became key persons for selection of GNSS receivers
- Participant introduced use of GNSS in floating dry docks
- Surveyors mentioned the ease of handling RTK and static survey receivers on understanding the theory
- Even meteorologists showed interest in using GNSS for meteorological uses

5. Further Endeavors

- Short Courses
- Endeavour for partnering with more organizations involved in GNSS for knowledge information sharing



Finally...

- Building up capacity vis-à-vis technical advancements in the field of GNSS
- Improvement in the Quality of life
- Extended cooperation between nations

.....

- Finally, all we aim at is to make the world a better place to live in for the future generations

