



Hands-on Satellite System

(SS1005)

Course Overview

Instructor: Chi-Kuang Chao

Department of Space Science and Engineering

National Central University

February 15, 2022

Syllabus

- Instructor: Chi-Kuang Chao
- Assistant: Qi-Yin Huang (黃琪茵, ext 36755 or 65781, huangq291@gmail.com)
- Course type: elective course
- Classroom location: S4-815-1 and S4-805
- Lecture time: 2 hours/week.
- Lecture hours: 13:00-15:00 (TUE).
- Office hour: 12:00-13:00 (TUE).
- Online link: <https://meet.google.com/bpj-tuuy-fts>

Objectives

- The course is designed for undergraduate freshmen to understand fundamental of satellite system using HEPTA-Sat kits.

Course outline

- Introduction
- Programming of On-Board Computer (OBC)
- Electrical Power Supply (EPS) Subsystem
- Command and Data Handling (CDH) Subsystem
- Sensor Subsystem
- Communication (COM) and Ground Station Subsystem
- Structure (STR) Subsystem
- Mission Implementation

Course materials

- Textbook: **HEPTA-Sat Training Textbook, Regular Course (4.5)**, UNISEC, Nov. 2020.
- **NTD 1,000 each** ~ NTD 690 + JPY 1,000.





Draft Rev.1

Publishing Contract on the HEPTA-Sat Textbook Between the University Space Engineering Consortium of Japan (UNISEC) and the Taiwan Association of Space Technology (TASTE)

1. Definitions and Parties

This Publishing Contract (referred to as the Contract) defines the terms and conditions of **printing and publishing** the HEPTA-Sat Textbook (referred to as the Textbook), a copyrighted material belonging to the University Space Engineering Consortium of Japan (referred to as UNISEC) conducted by the Taiwan Association of Space Technology (referred to as TASTE). UNISEC and TASTE are hereinafter called as the Parties in this Contract.

The Textbook is compiled as a hands-on training material of the HEPTA-Sat, which is a training tool satellite developed by Prof. Masahiko Yamazaki, Nihon University, Japan. Trainees can learn not only the basic subsystems of satellite, including structure, electrical power supply, command and data handling, communication, ground station, and sensors, but also how to integrate those subsystems to create a workable satellite as a whole.

This Contract also stipulates the terms and conditions of sales of the Textbook conducted by TASTE.

2. Background

In late 2020, UNISEC sent 5 sets of the HEPTA-Sat kits to the National Central University of Taiwan (NCU) by the international courier.

It is desirable and more effective that a hands-on HEPTA-Sat training should be ensured through a person-to-person style. However, taking into account the current difficult situation of cross-border human exchange due to the Covid-19, UNISEC and NCU agreed to proceed with the delivery of the Textbook to TASTE prior to such human exchange.

3. Duration

This Contract takes effect on the date of signature and continues for four (4) years. During this period, the Parties may discuss the usefulness of this Contract between UNISEC and TASTE, with a view to possible termination of the Contract without waiting for the complete of the full duration.

In case of such termination, either of the parties shall inform it to the other party in writing at least two months before an intended date.

Both parties shall settle any unsolved matters in an amicable way before the termination, if any.

4. Terms and Conditions

- UNISEC agrees to grant **printing**, publishing and sales rights of the Textbook to TASTE.
- UNISEC agrees to lend an electronic file (soft copy) of the HEPTA-Sat Textbook to TASTE for printing the Textbook.
- TASTE agrees to pay UNISEC a royalty on the Textbook of 1,000 JPY per **copy**.
- TASTE agrees to sell 300 copies of the Textbook within the period of the contract duration. In case of shortened period of the Contract, the number of selling copies will be determined in a separate agreement by both parties.
- A royalty payment shall be made from TASTE to UNISEC on a quarterly basis, except as otherwise noted.
- UNISEC's grant shall be effective only within the territory of Taiwan, except as otherwise requested by UNISEC.
- UNISEC's lending of the electronic file shall be used only for printing the Textbook within the above grant.
- TASTE agrees to delete the electronic file immediately right after the completion of the above publication and sales. At the same time, TASTE agrees to inform UNISEC of such deletion without delay.
- TASTE agrees to execute the above rights within the Contract and shall not transfer the rights to any third party. Any abuse of the rights, whether or not negligent, shall be subject to the compensation of damages.
- Both Parties agree that each should make the best effort to avoid any conflict of interest and if a conflict of interest should arise, both parties agree to solve it in an amicable way.

5. Contacts

Both Parties shall maintain the following contact for administrative and technical issues;

For UNISEC:

Rei Kawashima
rei@unisec.jp
UNISEC, Central Yayoi 2F,
2-3-2 Yayoi, Bunkyo-ku,
Tokyo 113-0032, Japan
Phone: +81-3-5800-6645

For TASTE:

Chi-Kuang Chao
ckchao@jupiter.ss.ncu.edu.tw
TASTE, S4-804,
No. 300, Zhongda Rd.,
Zhongli District, Taoyuan, 320317, Taiwan
Phone: +886-3-422-7151 ext. 65754

Invoice

To:
Taiwan Association of Space Technology
(TASTE),
S4-804, No. 300,
Zhongda Rd., Zhongli District,
Taoyuan, 320317, Taiwan

Invoice # : UNISEC-20096
Date : February 16, 2021

From:
University Space Engineering Consortium
(UNISEC)
Central Yayoi 2F, 2-3-2
Yayoi, Bunkyo-ku,
Tokyo 113-0032, Japan
Tel: +81-3-6231-4404
Fax: +81-3-3868-2208



Description	Unit Price	Quantity	Unit	Total (JPY)
© Royalty Payment for Printing, Publishing & Sales of HEPTA-Sat Textbooks	JPY			
○ Fee of Royalties on the Textbook	¥1,000	300		¥300,000
(Note: Under the Publishing Contract on the HEPTA-Sat Textbook)				
Total				¥300,000

SUM Total : ¥300,000

Note: Please bear the bank commission charges on your side.

Remarks:
Bank Details:
Bank: Mizuho Bank
Bank Code: 0001
Branch: Nezu Branch
Branch Code: 235
Swift Code: MHCBJPJT
Account Number: 1797808
Account Holder: University Space Engineering Consortium (UNISEC)
Bank Address: 2-7-9 Sendagi, Bunkyo-ku, Tokyo 113-0022, Japan
Tel: +81-3-3821-8181

Invoice

To:
Prof. Chi-Kuang Chao,
National Central University of Taiwan,
No. 300,
Zhongda Rd., Zhongli District,
Taoyuan, 320317, Taiwan

Invoice # : UNISEC-20097
Date : February 16, 2021

From:
University Space Engineering Consortium
(UNISEC)
Central Yayoi 2F, 2-3-2
Yayoi, Bunkyo-ku,
Tokyo 113-0032, Japan
Tel: +81-3-6231-4404
Fax: +81-3-3868-2208



Description	Unit Price	Quantity	Unit	Total (JPY)
© Lending Payment for the HEPTA-Sat Electronic Lecture Data Files (Annual)	JPY			
○ Fee of Lending the Lecture Data Files	¥25,000	1		¥25,000
○ Fee of Q & A Services	¥10,000	1		¥10,000
{Note: Based on the Letter of Commitment (LOC) on the Electronic Data Files. Effective for one year from the date of signing the such LOC}				
Total				¥35,000

SUM Total : ¥35,000

Note: Please bear the bank commission charges on your side.

Remarks:
Bank Details:
Bank: Mizuho Bank
Bank Code: 0001
Branch: Nezu Branch
Branch Code: 235
Swift Code: MHCBJPJT
Account Number: 1797808
Account Holder: University Space Engineering Consortium (UNISEC)
Bank Address: 2-7-9 Sendagi, Bunkyo-ku, Tokyo 113-0022, Japan
Tel: +81-3-3821-8181

出版品發印單

再版
 初版

編號202102

書名	Hepta-sat training					發印日期	110'02'
原印條碼	副文	1-1	數量	1,000	預定入庫日期	110'02'	
印刷廠	喜福	紙廠	有卷	紙張尺寸	G8	210*297 mm	
封面紙張	200P 銅版	內頁紙張	EOP 銅版	總頁數	372		
封面色數	4/0	內頁色數	1/1	頁數	372		
上光	亮P	裁切	穿線膠裝			定價	

上次採購號碼										
上次採購量/單價										
01紙張	項目	紙張	紙種	磅重	數量	單價	小計	合計	廠商	上開價
	封面	25*35	雪面銅版	200	0.8	1519	\$ 1,215			
	內頁	25*35	雪銅	80	55.5	658	\$ 38,730			
								\$ 39,954	有卷	
02印刷	項目	類別	色數	數量	單位	單價	小計	合計	廠商	備註
	出片	封面	4/0	4	版	250	\$ 1,000			
		內頁	4/4	372	版	130	\$ 48,360			
	晒版	封面		4	版	250	\$ 1,000			
		內頁		158	版	250	\$ 47,000			
	印刷	封面	4/0	4	令	350	\$ 1,400			
		內頁	4/4	372	令	250	\$ 97,260			
02上光	亮P			1	令	1300	\$ 1,300			
03裝訂	穿線膠裝			1000	PCS	16.5	\$ 16,500	\$ 214,320	喜福	

04製書製作					PCS					
05膠套					Set					
07加工					PCS					

售價	0	100%	定價	0	應付有卷未稅	\$ 39,954		
減項	訂裝費	2.72	#DIV/0!	第1年	應付喜福未稅	\$ 214,320		
	出片	15.46	#DIV/0!	第1年				
	後製成本	204.91	#DIV/0!					
毛利	(221.09)	#DIV/0!						
減項	規稅	0.00	#DIV/0!					
	管理成本	0.00	#DIV/0!					
淨利	(224.09)	#DIV/0!						
成本	項目	01紙張	02出片	03印刷	03裝訂	04CD	未稅總計	合計總計
	合計	39,954	49,360	148,160	16,500	0	214,274	\$268,938
	報價成本	\$39.85	\$49.36	\$148.43	\$16.50	\$0.00	\$254.27	\$266.99

	出版品經理	印務經理
		孫德化

出版品發印單

再版
 初版

編號202102

書名	Hepta-sat training					發印日期	110'02'
原印條碼	副文	1-1	數量	300	預定入庫日期	110'02'	
印刷廠	喜福	紙廠	有卷	紙張尺寸	G8	210*297 mm	
封面紙張	200P 銅版	內頁紙張	EOP 銅版	總頁數	372		
封面色數	4/0	內頁色數	4/4	頁數	372		
上光	亮P	裁切	穿線膠裝			定價	

上次採購號碼										
上次採購量/單價										
01紙張	項目	紙張	紙種	磅重	數量	單價	小計	合計	廠商	上開價
	封面	25*35	雪面銅版	200	0.4	1619	\$ 608			
	內頁	25*35	雪銅	80	21.6	695	\$ 15,077			
								\$ 15,684	有卷	
02印刷	項目	類別	色數	數量	單位	單價	小計	合計	廠商	備註
	出片	封面	4/0	4	版	250	\$ 1,000			
		內頁	4/4	372	版	130	\$ 48,360			
	晒版	封面		4	版	250	\$ 1,000			
		內頁		189	版	250	\$ 47,000			
	印刷	封面	4/0	4	令	350	\$ 1,400			
		內頁	4/4	182	令	380	\$ 72,950			
02上光	亮P			0.5	令	1300	\$ 650			
03裝訂	穿線膠裝			300	PCS	33	\$ 9,900	\$ 101,370	喜福	

04製書製作					PCS					
05膠套					Set					
07加工					PCS					

售價	0	100%	定價	0	應付有卷未稅	\$ 15,684		
減項	訂裝費	2.72	#DIV/0!	第3年	應付喜福未稅	\$ 181,370		
	出片	54.84	#DIV/0!	第1年				
	後製成本	432.31	#DIV/0!					
毛利	(549.83)	#DIV/0!						
減項	規稅	0.00	#DIV/0!					
	管理成本	0.00	#DIV/0!					
淨利	(549.83)	#DIV/0!						
成本	項目	01紙張	02出片	03印刷	03裝訂	04CD	未稅總計	合計總計
	合計	15,684	49,360	123,010	9,000	0	197,054	\$206,932
	報價成本	\$52.28	\$134.53	\$410.00	\$30.00	\$0.00	\$526.81	\$600.00

	出版品經理	印務經理
		孫德化

投標廠商報價單

BIDDING FORM

如有權簽署人簽名，請以正楷或打字填列其姓名及職稱

If Signed by Authorized Personnel, Name and Title of the Personnel (type or print)

招標案號 Invitation No. : 109U-065L 日期 Date: July 10, 2020

項次 Item No.	品名及規格 Nomenclature, Description and Specification	數量及單位 Quantity and Unit	單價 (幣別) Unit Price (Currency)	總價 (幣別) Total Price (Currency)	製造廠或勞務供應者名 稱、地址 Name and Address of Manufacturer Service Provider
	<u>HEPTA – Sat Kits</u>	5	(JPY) 660,000	(JPY) 3,300,000	<u>UNISEC</u> Central Yayoi 2F, 2-3-2 Yayoi, Bunkyo-ku, Tokyo 113-0032, Japan
標價總額 Grand Total: JPY 3,495,000-					

註：1.以 CFR/CPT 或 CIF/CIP 條件報價者，須分別報列運費或保險費。分項(組)決標者，須按項(組)次分別報列。2.本欄如不敷填寫請用附頁。
Notes: 1. For Bid Term on CFR/CPT or CIF/CIP basis, the freight or insurance premium shall be quoted separately. When awarded by item (group), freight or insurance premium shall be quoted separately according to the relevant item (group). 2. Use attachment as necessary

財物/勞務原產地 Source Origin of Property/Service: JAPAN

發貨人(名稱、地址)Shipper (name & address): Same as the Service Provider above

收款人/信用狀受益人(名稱、地址)Payee/ L/C Beneficiary (name & address): Dr. Chi-Kuan Chao, National Central University, Taoyuan City, Taiwan (ROC)

進口產品之裝運港口/機場 Port/ Airport of Shipment for Import Property: Haneda, Tokyo, Japan

(請按實鈎填 Check by/ if applicable)

本投標廠商確認標價不高於同樣市場條件之相同標之最低價格。

The Tenderer confirms that the price offered is not higher than the lowest price we offered for the same subject matter under the same market conditions.

本投標廠商確認並無支付他人佣金、比例金、仲介費、後謝金或其他利益為條件，促成次購契約之簽定

The Tenderer is/will not induce the procuring entity to sign a contract by giving others commission, percentage, brokerage, kickback, or any other benefits.

本投標廠商茲同意並接受招標文件規定之所有條件，且確認所報規格均符合招標文件之要求。

We, the Tenderer, hereby certify that all the terms and conditions specified in the Invitation Documentation are agreed and accepted by us without exceptions, deviations, additional clauses, comments, and the like. We also confirm that all the specifications offered are fully in conformity with the requirements in the Invitation documentation.

投標廠商簽章;

Seals or Signature

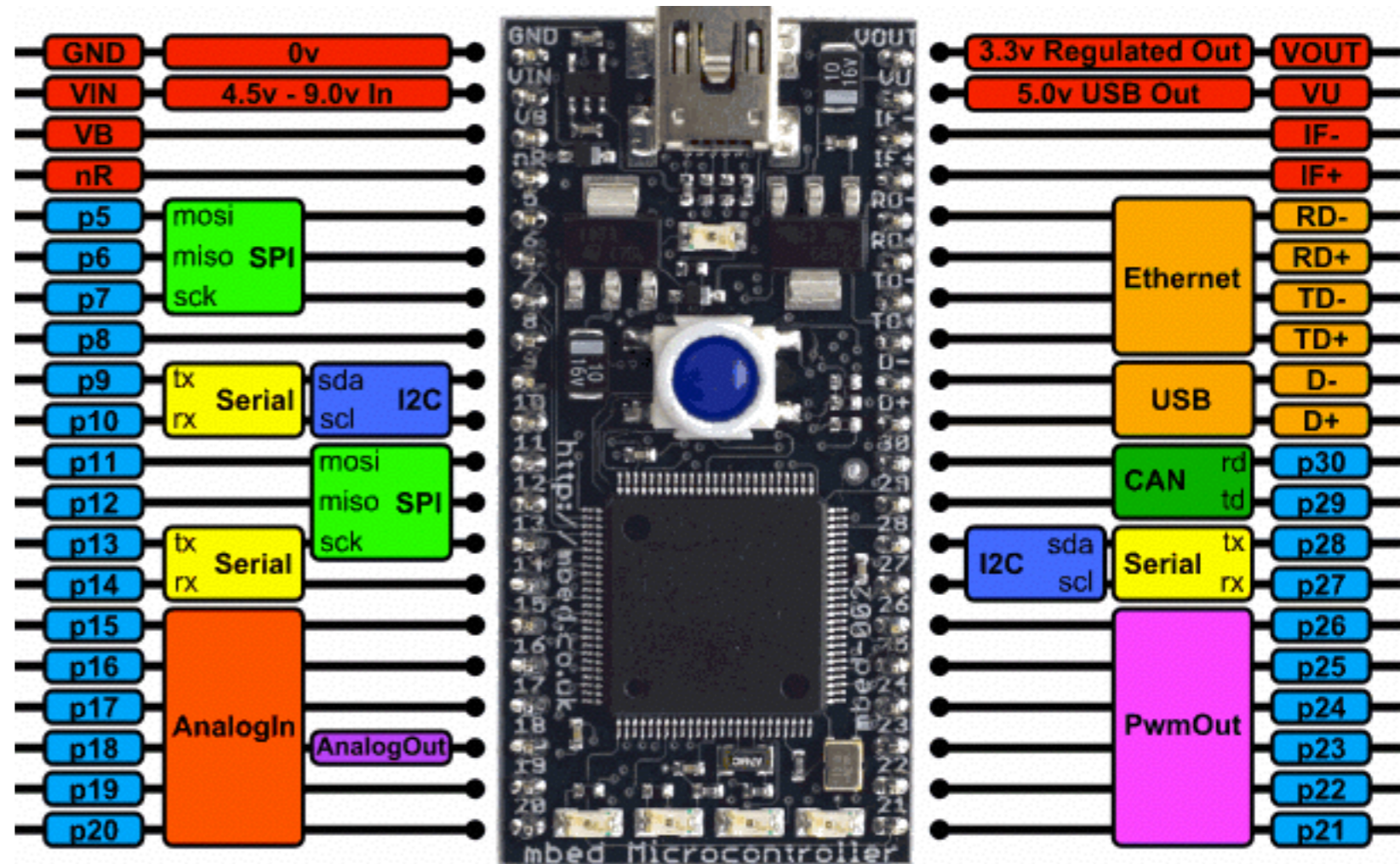
Of the Tenderer: Yasuyuki Miyazaki, Chairperson of UNISEC

投標廠商公司章及負責人章或有權簽署人簽名 Seals of the Tenderer and its Responsible Personnel, or

Signature of Authroized Personnel



mbed LPC 1768 (OMI 1043,598)



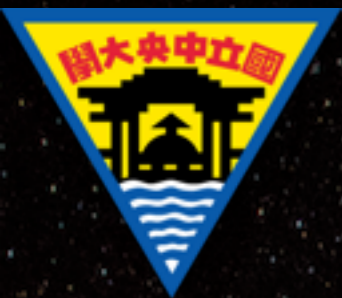
MOUSER Electronics: TWD 1,687 (775 in stock)

Digi-Key Electronics: TWD 1,721 (38 in stock)

Grading

- Lab practices (100%)

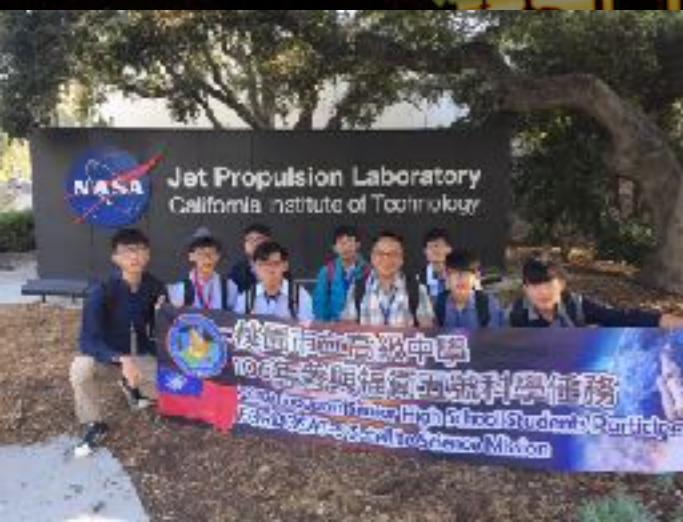
Week #	1st session	2nd session
1 (2022/2/15)	Course overview (online)	Break
2 (2022/2/22)	Introduction	
3 (2022/3/1)	Programming of On-Board Computer	
4 (2022/3/8)	Programming of On-Board Computer	
5 (2022/3/15)	Electrical Power Supply Subsystem	
6 (2022/3/22)	Electrical Power Supply Subsystem	
7 (2022/3/29)	Command and Data Handling Subsystem	
8 (Spring break, 2022/4/5)	Break	
9 (Mid-term, 2022/4/12)	Break	
10 (2022/4/19)	Command and Data Handling Subsystem	
11 (2022/4/26)	Sensor Subsystem	
12 (2022/5/3)	Sensor Subsystem	
13 (2022/5/10)	Communication and Ground Station Subsystem	
14 (2022/5/17)	Communication and Ground Station Subsystem	
15 (2022/5/24)	Structure Subsystem	
16 (2022/5/31)	Structure Subsystem	
17 (2022/6/7)	Mission Implementation	
18 (Final, 2022/6/14)	Break	



太空系學生專享權益



- 為鼓勵對太空具有夢想與熱情的全國高中職生投考中大太空科學與工程學系，推動太空系學生能儘早投身太空科學研究或參與太空產業研發，本校**太空科學與科技研究中心**每年編列預算最高**一百萬元**，選拔表現優異且具創意的學生，補助參加國內外各項**太空科學與科技會議**、**太空相關機構的參訪與實習**、**研製與發射自製的酬載與立方衛星**，一圓學子的太空夢。
- 在**四年內**發射與執行自行規劃的**立方衛星**任務。





四年內發射學生立方衛星



	大一	大二	大三	大四
第一學期	工程實習 (必)	太空專題 I (必) iCASE	太空科學 太空工程	太空科學 太空工程
寒假	NI CLAD	PDR	PAR	Satellite Launch
第二學期	衛星系統實作 (選)	太空專題 II (必)	太空科學 太空工程	太空科學 太空工程
暑假	AGI STK MDR/SDR	CDR	SmallSat ITR	AOGS

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All Level One Level Two Level Three

EXPAND ALL

Instructor-Led Live Training

Course	Date	Location	Action
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On-Demand Training

請用學校電郵地址申請

<https://www.agi.com/training-and-certification#train>

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Training | Certification

All Certifications STK ODTK TETK STK Integration

Certification Details

Level 1: STK Certification [Register Now](#)

Prerequisites: None

Level 1 STK Certification covers the skills that are fundamental to the free version of STK. This test will require you to demonstrate proficiency with the basic features of STK, such as building basic scenarios, generating reports, and recording videos.

To prepare for the test, AGI recommends that you complete the [Level 1 Beginner tutorials](#). These lessons will take about four hours to complete. After you register for the test, you will have 14 days to complete and submit it.

LEVEL 1

<https://www.agi.com/training-and-certification#cert>



AGI STK



- Level 1: STK Certification
- Level 2: STK Master Certification





立方衛星任務報名與審查



- 以立方衛星為標的，研製酬載、次系統、衛星本體等，實現科學任務。
- **2022/7/1 (FRI)**: 中午前報名，至少五人一組（最好是同班同學），請填選以下表單（稍後提供）。14:00-15:00 任務定義審查說明。
- **2022/8/2 (FRI)**: 14:00-17:00 任務定義審查 (Mission Definition Review, MDR) 與系統設計審查說明。
- **2022/9/3 (FRI)**: 14:00-17:00 系統設計審查 (System Design Review, SDR)。

For more information

- Please visit the course web page at <http://athena.ss.ncu.edu.tw/>
- Contact me
 - By phone: 03-4227151
 - Ext.65754 at S4-804 (Office)
 - Ext.36755 at S4-820 (SPL - learning facilities)
 - Ext.65781 at S4-805-1 (SPL - core facilities)
 - By e-mail: ckchao@jupiter.ss.ncu.edu.tw