

**CD4+ LYMPHOCYTE COUNTING USING  
PIXEL-BASED FEATURES IN LOW  
RESOLUTION FLUORESCENCE  
AND BRIGHT FIELD IMAGES**

**USANEE APIJUNTARANGOON**

**MASTER OF ENGINEERING**

**IN BIOMEDICAL ENGINEERING**

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**GRADUATE SCHOOL  
CHIANG MAI UNIVERSITY  
JULY 2015**

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**A THESIS SUBMITTED TO CHIANG MAI UNIVERSITY IN PARTIAL  
FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF**

**MASTER OF ENGINEERING  
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THIS THESIS HAS BEEN APPROVED TO BE A PARTIAL FULFILLMENT OF  
THE REQUIREMENTS FOR THE DEGREE OF  
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