

4 3 7

4 3 7

4 3 7

4 3 7

4 3 7

4 3 7

3 7

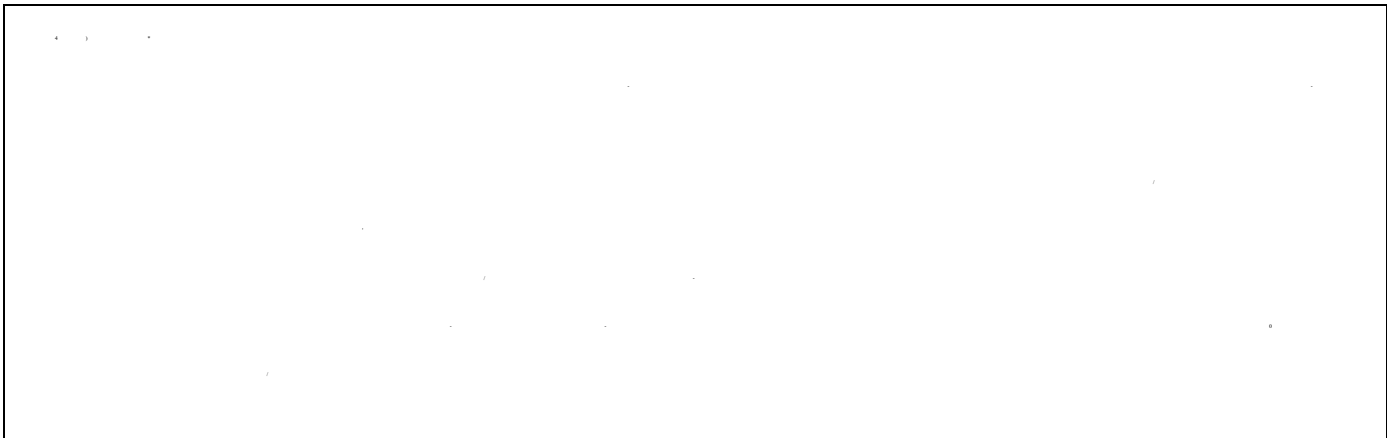
4 3 7

4 3 7

3 7

4 3 7

4 3 7



| | |
|---|---|
| | |
| 3 | 3 |
| 3 | 4 |
| 3 | 4 |
| 3 | 4 |

| | |
|--|---|
| | |
| | 3 |
| | 3 |
| | 3 |

①

②

①

②

③

④

⑤

⑥

⑦

⑧

⑨

⑩

⑪

①

②

③

7DEOH RI 5HJLVWUDWLRQ 6FLHQFH 3URJUDP 0ROHFXODU \$JUR /LIH 6FLHQ

>&,QWHJUDWLYH +\GURVSKHULF 6FLHQFH 3URJUDP 0ROHFXODU \$JUR /LIH 6FLHQ

)RRG 6FLHQFH 3URJUDP 0ROHFXODU \$JUR /LIH 6FLHQ

| 7\SH | LQ | 5HTXLUHG W\SHRI &ODVV VXEM FUHGLWV | 1R RI FRXUVH FUHGLWV UHJLVWV | <HDU LQ ZKLFK WKH V\X | | | | | | | | |
|--|--------------------------------------|--|---|------------------------------------|---------------|---------------|---------------|---------------|---------------|--|--|--|
| | | | | 6SULO)DOO | 6SULO)DOO | 6SULO)DOO | 6SULO)DOO | 6SULO)DOO | 6SULO)DOO | | | |
| /LEHUDO \$UWV (GXFDWLRQ &RPPRQ 6XEMHFWV | %DVLV &RXUVH 8QLYHUVLW | 3HDFH 6FLHQFH &RXUVHV | | Ñ | 5HTXLUHG | | | | | | | |
| | | ,QWURGXFWRU\ 6HPLQDU IRU)LUVW <HDU 6WXGHQWV | ,QWURGXFWRU\ 6HPLQDU IRU)LUVW <HDU 6WXGHQWV | 5HTXLUHG | Ô | | | | | | | |
| | | ,QWURGXFWRU\ 6HPLQDU 8QLYHUVLW (GXFDWLRQ | ,QWURGXFWRU\ 6HPLQDU IRU)LUVW <HDU 6WXGHQWV | 5HTXLUHG | Ô | | | | | | | |
| | | Development Seminar | 1RWH | Ñ | Ñ | Ñ | Ñ | Ñ | Ñ | | | |
| |)RUHLJQ /DQJXDJH &RPPRQ 6XEMHFWV | (QJOLVK 1RW)RUHLJQ /DQJXDJH | %DVLV (QJOLVK 8VDJH | &RPPXQLFDWLRQ %DVLV , 5HTXLUHG | Ô | | | | | | | |
| | | | &RPPXQLFDWLRQ ,)RUHLJQ /DQJXDJH | &RPPXQLFDWLRQ %DVLV ,, 5HTXLUHG | Ô | | | | | | | |
| | | | &RPPXQLFDWLRQ ,,)RUHLJQ /DQJXDJH | &RPPXQLFDWLRQ , \$ 5HTXLUHG | Ô | | | | | | | |
| | | | &RPPXQLFDWLRQ ,,)RUHLJQ /DQJXDJH | &RPPXQLFDWLRQ ,, 5HTXLUHG | Ô | | | | | | | |
| | |)RUHLJQ /DQJXDJH)RUHLJQ /DQJXDJH 6HOHFW RQH ODQJXDJH 1RWH | %DVLV)RUHLJQ /DQJXDJH , | %DVLV)RUHLJQ /DQJXDJH , | Ô | | | | | | | |
| | | | %DVLV)RUHLJQ /DQJXDJH ,, | %DVLV)RUHLJQ /DQJXDJH ,, | Ô | | | | | | | |
| | | | %DVLV)RUHLJQ /DQJXDJH ,, | %DVLV)RUHLJQ /DQJXDJH ,, | Ô | | | | | | | |
| | | | %DVLV)RUHLJQ /DQJXDJH ,9 | %DVLV)RUHLJQ /DQJXDJH ,9 | Ô | | | | | | | |
| |)RUHLJQ /DQJXDJH)RUHLJQ /DQJXDJH | ,QWURGXFWRU\ 6HPLQDU)LUVW <HDU 6WXGHQWV | ,QWURGXFWRU\ 6HPLQDU IRU)LUVW <HDU 6WXGHQWV | 5HTXLUHG | Ô | | | | | | | |
| | | ,QWURGXFWRU\ 6HPLQDU)LUVW <HDU 6WXGHQWV | ,QWURGXFWRU\ 6HPLQDU IRU)LUVW <HDU 6WXGHQWV | 5HTXLUHG | Ô | | | | | | | |
| |)RUHLJQ /DQJXDJH)RUHLJQ /DQJXDJH | \$UHD &RXUVHV | 1RWH | (OHFWLYH 5HTXLUHG | Ñ | Ñ | Ñ | Ñ | Ñ | | | |
| &k 4 &É% (QJ" 6RFLDO &RRSHUDWLRQ &RXUVHV | | 1 R W H | Ñ | Ñ | Ñ | Ñ | Ñ | Ñ | | | | |
| +HDOWK DQG 6SRUWV &RXUVHV | | 1RWH | (OHFWLYH 5HTXLUHG | Ñ | Ñ | | | | | | | |
|)RUHLJQ /DQJXDJH)RUHLJQ /DQJXDJH | 2UJDQLF &KHPLVWU\ &HOO 6FLHQFH | | | Ô | | | | | | | | |
| | | | | Ô | | | | | | | | |

| | | | | | | | | | | | | |
|--|-------|--|--|----------|--|--|--|--|--|--|--|--|
| | | <p>3% DVLF / DERU DWRU \ : RUN LQ & KHPLVWU \ ' RU "Experimental Methods and Laboratory Work in Chemistry I" (Note5)</p> | | | | | | | | | | |
| | | <p>"Experimental Methods and Laboratory Work in Biology I"</p> | | 5HTXLUHG | | | | | | | | |
| | 7RWDO | | | | | | | | | | | |

7DEOH RI 5HJLVWUDWLRQ 6WDQGDUGV 6SHFLDOLJHG)XQGD

>&,QWHJUDWLYH +\GURVSKHULF 6FLHQFH 3URJUDP 0ROHFXODU \$JUR /LIH 6FLHQFH 3URJ

6FLHQFH 3URJUDP 0ROHFXODU \$JUR /LIH 6FLHQFH 3URJ

| 7\SH | 6XEMHFW | 5HTXLUHG | 1R RI | <HDU LQ ZKLFK WKH VXEMHFW L | | | | | | | | | | | | | | | | |
|-------------------------------------|---------------------------------|----------|-------|-----------------------------|------|-------|------|-------|------|-------|------|--|--|--|--|--|--|--|--|--|
| | | | | 6SULQ | | 6SULQ | | 6SULQ | | 6SULQ | | | | | | | | | | |
| | | | | (DOO |)DOO | (DOO |)DOO | (DOO |)DOO | (DOO |)DOO | | | | | | | | | |
| 6SHFLDOLJHG 6XEMHFW | 6SHFLDOLJHG)XQGDPHQWDO 6XEMHFW | 5HTXLUHG | 1R RI | ,QWURGXFWRQ WR \$SSOLHG | | | | | | | | | | | | | | | | |
| | | | | %LRORJLFDO 6FLHQFHV | | | | | | | | | | | | | | | | |
| | | | | ,QWURGXFWRQ WR | | | | | | | | | | | | | | | | |
| | | | | 0LFURELRORJ\ | | | | | | | | | | | | | | | | |
| | | | | ,QWURGXFWRQ WR 0ROHFXODU | | | | | | | | | | | | | | | | |
| | | | | %LRFKHPLVWU\ | | | | | | | | | | | | | | | | |
| | | | | \$JULFXOWXUDO 3URGXFWLRQ | | | | | | | | | | | | | | | | |
| | | | | 5HVRXUFHV | | | | | | | | | | | | | | | | |
| | | | | 3K\VLV IRU \$SSOLHG Ñ | | | | | | | | | | | | | | | | |
| | | | | %LRORJLFDO 6FLHQFH | | | | | | | | | | | | | | | | |
| | | | | (WKLFV RI 6FLHQFH DQG | | | | | | | | | | | | | | | | |
| | | | | 7HFKQRORJ\ | | | | | | | | | | | | | | | | |
| | | | | 6WDWLWLV LQ %LRORJ\ Ñ | | | | | | | | | | | | | | | | |
| | | | | (QYLURQPHQWDO 6FLHQFHV | | | | | | | | | | | | | | | | |
| | | | | IRU %LRSURGXFWRQ | | | | | | | | | | | | | | | | |
| | | | | /DERUDWRU\ :RUN LQ | | | | | | | | | | | | | | | | |
| | | | | *HQHUDO %LRORJ\ , | | | | | | | | | | | | | | | | |
| | | | | /DERUDWRU\ :RUN LQ | | | | | | | | | | | | | | | | |
| | | | | *HQHUDO %LRORJ\ , , | | | | | | | | | | | | | | | | |
| | | | | /DERUDWRU\ :RUN LQ | | | | | | | | | | | | | | | | |
| | | | | *HQHUDO &KHPLVWU\ | | | | | | | | | | | | | | | | |
| | | | | /DERUDWRU\ :RUN LQ | | | | | | | | | | | | | | | | |
| | | | | *HQHUDO 3K\VLV | | | | | | | | | | | | | | | | |
| Required Subjects: Total 20 credits | | | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | |
|--|--|---|--|--|--|--|--|---|--|
| | | 6HPLQDU LQ)LHOG 6FLHÑQFH | | | | | | | |
| | | 5HVHDUFK)URQW RI Ñ | | | | | | | |
| | | %LRUHVRXUFH 6FLHQFHV | | | | | | | |
| | | 5HVHDUFK)URQW RI)RÑG | | | | | | | |
| | | DQG \$JUL/LIH 6FLHQFH | | | | | | | |
| | | ,QWURGXFWRQ WR Ñ | | | | | | | |
| | | 3K\VLRORJ\ | | | | | | | |
| | | 3XEOLF +HDOWK | | | | | | Ñ | |
| | | (OHFWLYH 5HTXLUHG 6XEMHFWV | | | | | | | |
| | | 7DNH FUHGLWV IURP DERYH VXEMHFWV | | | | | | | |
| | | 5HGXQGDQW FUHGLWV RYHU FUHQHDFK 3URRYUDWR | | | | | | | |

7DEOH RI 5HJLDOLJHG 6XEMHFWV

>8)RRG 6FLHQFH 3URJUDP

| 7\SH | 6XEMHFWRV | 5HTXLUHG FUHGLWV | &ODVV VXEMHFWV | 1R RI FUHG | <HDU LQ ZKLFK WKH VXEMHFWV | | | | | | |
|---|----------------------|---------------------|--|--------------------------------------|----------------------------|----------------|----------------|----------------|--|--|--|
| | | | | | 6SULQJ)DOO | 6SULQJ)DOO | 6SULQJ)DOO | 6SULQJ)DOO | | | |
| 6SHFLDOLJHG 6XEMHFWV | 6SHFLDOLJHG 6XEMHFWV | |)RRG %LRFKHPLVWU\ \$\$\$SOLHG %LRSK\VLV)RRG (QJLQHHULQJ)RRG +\JLHQH 6HDIRRG &KHPLVWU\ DQG %LRFKHPLVWU\)RRG 3URGXFWLRQ 0DQDJPHQW /DERUDWRU\ :RUN LQ \$\$\$SOLHG %LRSK\VLV /DERUDWRU\ :RUNV LQ)RRG (QJLQHHULQJ /DERUDWRU\ :RUN LQ)RRG +\JLHQH 5HDGLQJ RI)RUHLQJ /LWHUDWXUH LQ)RRG 6FLHQFH 1XWULWLRQ /DERUDWRU\ :RUN LQ)RRG &KHPLVWU\ /DERUDWRU\ :RUN LQ 0DULQH %LRUHVRXUFH &KHPLVWU\ /DERUDWRU\ ZRUN LQ 1XWULWLRQDO %LRFKHPLVWU\)LHOG :RUNV RI)RRG 3URGXFWLRQ 0DQDJPHQW *UDGXDWLRQ 7KHVLV , *UDGXDWLRQ 7KHVLV ,, *UDGXDWLRQ 7KHVLV ,,, | | | | | | | | |
| | | | | Required Subjects: Total | | | | FUHGLWV | | | |
| | | | | 6FLHQFH DQG 7HFKQRORJ\ IRU)RRG | | | | | | | |
| 'HYHORSPHQW | | | | | | | | | | | |
|)RRG)XQFWLRQ)XQFWLRQDO)RRG 6FLHQFH | | | | | | | | | | | |
|)RRG 3K\VLFD 3URSHU\ 6FLHQFH | | | | | | | | | | | |
|)RRG 0LFURELORJ\ | | | | | | | | | | | |
| %LRUHVRXUFH 8WLOLJDWLRQ 6FLHQFH | | | | | | | | | | | |
|)RRG 6\VVHP | | | | | | | | | | | |
| \$JULFXOWXUDO 3URGXFWV DQG)RRG 3URFHVVVLQJ | | | | | | | | | | | |
| 7UDLQLQJ IRU 0DULQH)RRG 3URFHVVVLQJ | | | | | | | | | | | |
| 7UDLQLQJ IRU \$QLPDO)RRG 3URFHVVVLQJ | | | | | | | | | | | |
|)RRG)DFWRU ,QVSHFWLRQ | | | | | | | | | | | |
|)RRG ,QIRUPDWLRQ 0DQDJPHQW | | | | | | | | | | | |
| (OHFWLYH 5HTXLUHG 6XEMHFWV 7DNR\H VXEMHFWV | | | | 5HGXDQW FUHGLWV RYHU FUHGLWV PRYH WR | | | | | | | |

| | | | | | | | | |
|--|--|--|---|--|--|--|-----------------------|--|
| | | | *HQRPH 6FLHQFH , *HQRPH 6FLHQFH ,, 0ROHFXODU &HOO %LRORJ\ \$QLPDO 1XWULWLRQ 3ODQW 1XWULWLRQDO 3K\VLRLORJ\ | | | | Ñ Ñ Ñ Ñ Ñ | |
| | | | (OHFWLYH At 6510 HFUWHGLWV PXVW EH REWDLQHG í 6SHFLDOLJHG VXEMHFW FORPORMKPED \$SFDQ EH LQFOXGHG LQ WKH í 8S WR FUHGLWVHEFDLQHG MXJRPKRSV DQGDICRPHKHEHFWKH \$,06 3URJUDP FRPSOHWHGH DWLQDMGRQSDOFFHUHQEYXGJHGTXLUHG IRU J í &UHGLWV REWDLQHG (GXFDFLERQ DQVWUHFUODVDEG VSRMHWVWRQ FIDQ LQFOXGHG LQ WKH FUHGLWV UHTXLUHG IRU JUDGXDWLQ | | | | | |
| | | | | | | | | |

>&UHGLWV UHTXLUHG IRU JUDGXDWLQDO@DUWFWUHG KVVUMIGRUVVSRMHWVWRQ FIDQ]H
 VXEMHFW VSRMHWVWRQ FIDQ]H

| | | | | | |
|---|--|--|--|--|---|
| L Q J | ([SHUWLVH UHJDUGLQJ PDQDJHPPHQW DQG GLV | &DSDEOH RI SURYLGLQJ SU SHRGGXFMQLRQURGXFWLRQ RULRQALRQLRHIIRGRFLDWL RWKHU LWHPV | &DSDEOH RISSURYLGLRQ H[SODQDWLRQ UHJDUGLQJ SODQDWLRQ UHJDUGLQJ SODQDWLRQ UHJDUGLQJ | SODQDWLRQ UHJDUGLQJ SODQDWLRQ UHJDUGLQJ SODQDWLRQ UHJDUGLQJ | |
| | ([SHUWLVH UHJDUGLQJ WHFKQRORJLHV DQG G PDWHULDOV | &DSDEOH RI SURYLGLQJ SU UHJDUGLQJ IRRG SURFHVVL GHYHORSPPHQW RI XVHIXO LW ZLWK NQRZOHGJH RI WK | &DSDEOH RISSURYLGLRQ H[SODQDWLRQ UHJDUGLQJ IRRG &DSDEOH RI SURYLGLQJ IRRG SODQDWLRQ UHJDUGLQJ IRRG | SODQDWLRQ UHJDUGLQJ IRRG &DSDEOH RI SURYLGLQJ IRRG SODQDWLRQ UHJDUGLQJ IRRG | |
| S E L O L W L H V | %DVLV DELOLW\ LQ FRP LQIRUPDWLRQ SURFHVV DFWLYLWLHV UHTXLUH | +DV VXSHULRU DELOLW\ LQ FRP LQIRUPDWLRQ LQIRUPD SULFHWLQJ SFWLYLWQH VHT IRU DFTXLULQJ H[SHUWLVH | +DV VXSHULRU DELOLW\ LQ FRP LQIRUPDWLRQ LQIRUPD SULFHWLQJ SFWLYLWQH VHT IRU DFTXLULQJ H[SHUWLVH | +DV VXSHULRU DELOLW\ LQ FRP LQIRUPDWLRQ LQIRUPD SULFHWLQJ SFWLYLWQH VHT IRU DFTXLULQJ H[SHUWLVH | |
| | %DVLV H[SHULPHQWDWL UHTXLUH IRU DFTXLUL | +DV VXIILFLHQW EDVLV H[SH VNLOOV UHTXLUH IRU DFTXL EDSDEOH RI DXWRQRPRXVO LQ H[SHUWLVH | +DV VXIILFLHQW EDVLV H[SH VNLOOV UHTXLUH IRU DFTXL EDSDEOH RI DXWRQRPRXVO LQ H[SHUWLVH | +DV VXIILFLHQW EDVLV H[SH VNLOOV UHTXLUH IRU DFTXL EDSDEOH RI DXWRQRPRXVO LQ H[SHUWLVH | |
| | %DVLV WHFKQLTXHV DQ KDQGLQJ IRRGV DQG I WR XQGHUVWDQG YDUL UHJDUGLQJ IRRGV IURP YLHZ DQG FDSDELOLW\ VWXG\ UHVXOW LQ D U | G PHWKRGORJLHV IRU +DV VXSHULRU DELOLW\ LQ FRP LQIRUPDWLRQ LQIRUPD SULFHWLQJ SFWLYLWQH VHT IRU DFTXLULQJ H[SHUWLVH | G PHWKRGORJLHV IRU +DV VXSHULRU DELOLW\ LQ FRP LQIRUPDWLRQ LQIRUPD SULFHWLQJ SFWLYLWQH VHT IRU DFTXLULQJ H[SHUWLVH | G PHWKRGORJLHV IRU +DV VXSHULRU DELOLW\ LQ FRP LQIRUPDWLRQ LQIRUPD SULFHWLQJ SFWLYLWQH VHT IRU DFTXLULQJ H[SHUWLVH | G PHWKRGORJLHV IRU +DV VXSHULRU DELOLW\ LQ FRP LQIRUPDWLRQ LQIRUPD SULFHWLQJ SFWLYLWQH VHT IRU DFTXLULQJ H[SHUWLVH |
| | \$FTXLVLWLRQ RI WHFKQ IRRGV IURP PDULQH DQ DQG FDSDELOLW\ RI FR PHDVXUHV IRU FRQYHU IXQFWLRQDO IRRGV | LTXHV IRU SURGXFWLRQ RI +DV VXSHULRU DELOLW\ LQ FRP LQIRUPDWLRQ LQIRUPD SULFHWLQJ SFWLYLWQH VHT IRU DFTXLULQJ H[SHUWLVH | LTXHV IRU SURGXFWLRQ RI +DV VXSHULRU DELOLW\ LQ FRP LQIRUPDWLRQ LQIRUPD SULFHWLQJ SFWLYLWQH VHT IRU DFTXLULQJ H[SHUWLVH | LTXHV IRU SURGXFWLRQ RI +DV VXSHULRU DELOLW\ LQ FRP LQIRUPDWLRQ LQIRUPD SULFHWLQJ SFWLYLWQH VHT IRU DFTXLULQJ H[SHUWLVH | LTXHV IRU SURGXFWLRQ RI +DV VXSHULRU DELOLW\ LQ FRP LQIRUPDWLRQ LQIRUPD SULFHWLQJ SFWLYLWQH VHT IRU DFTXLULQJ H[SHUWLVH |
| V N L O O V | &DSDEOH RI RUJDQL]LQ LVVXH WR H[SORUH LQ VFLHQFH IURP D VRFLD RQ H[SHULHQFH RI VXF IRRG PDQXIDFWXULQJ VHT | &DSDEOH RI DSSO\LQJ ILQ REWDLQHG LQ WKH REVHUY O'DQG IURP DQG H[SHULPHQ FRQHTFLWRQ RI WRWK VRFL FRVLGHV RI YLHZ EDVHG IURP REVHUYLQJ VRFLD WR WKDW LQ WKH OHFWXU XQLYHUVLW\ | &DSDEOH RI DSSO\LQJ ILQ REWDLQHG LQ WKH REVHUY O'DQG IURP DQG H[SHULPHQ FRQHTFLWRQ RI WRWK VRFL FRVLGHV RI YLHZ EDVHG IURP REVHUYLQJ VRFLD WR WKDW LQ WKH OHFWXU XQLYHUVLW\ | &DSDEOH RI DSSO\LQJ ILQ REWDLQHG LQ WKH REVHUY O'DQG IURP DQG H[SHULPHQ FRQHTFLWRQ RI WRWK VRFL FRVLGHV RI YLHZ EDVHG IURP REVHUYLQJ VRFLD WR WKDW LQ WKH OHFWXU XQLYHUVLW\ | |

| | | | |
|---|---|--|---|
| \$E L O L W \ W R Q G H D G V D Q G W H F K O L F D O H [S O D Q D W L R Q V D Q G E D V L F U H D G L O J F D S D E L O L W \ H V E D S D E O H R I X Q G H U V W D Q G R I V F L H Q W L I L F (Q J O L V K X Q G H U V W D Q G L Q J W H F K O L F D O V R P H I H W H Q W | & D S D E O H R I U H D G L O J (Q J O L V K W H I W Y D Q G | + D V D E D V I F D E L O L W \ I R U U H D G L O J E D Q I O L V K L W H W V R D Q G H D G L Q J (Q J H [S O D Q D W L R Q V D Q G E D V L F U H D G L O J F D S D E L O L W \ H V E D S D E O H R I X Q G H U V W D Q G L Q J W H F K O L F D O V R P H I H W H Q W | H [S O D Q D W L R Q V D Q G E D V L F U H D G L O J F D S D E L O L W \ H V E D S D E O H R I X Q G H U V W D Q G L Q J W H F K O L F D O V R P H I H W H Q W |
|---|---|--|---|

| | | | | |
|---|-------------------------------------|---|---|---|
| F | &DSDELWL\ RI FROOHF | W L Q J L Q I R U P D W L R Q R I W K H | L O I R U P D W L R Q R I W K H S H U L S K H U D O | |
| D | SHULSKHUDO GLVFLSOL | Q D S D E O H R I F R O O H F W L Q J | L O I R U P D W L R Q R I W K H S H U L S K H U D O | L O I R U P D W L R Q R I W K H S H U L S K H U D O |
| S | KL V K H U R Z Q L G H D E D V | Q D S D E O H R I F R O O H F W L Q J | L O I R U P D W L R Q R I W K H S H U L S K H U D O | L O I R U P D W L R Q R I W K H S H U L S K H U D O |
| D | Y D O L G D W L Q J W K H L G H D | Q D S D E O H R I F R O O H F W L Q J | L O I R U P D W L R Q R I W K H S H U L S K H U D O | L O I R U P D W L R Q R I W K H S H U L S K H U D O |
| L | L Q I R U P D W L R Q O R J L F D O | Q D S D E O H R I F R O O H F W L Q J | L O I R U P D W L R Q R I W K H S H U L S K H U D O | L O I R U P D W L R Q R I W K H S H U L S K H U D O |
| E | FRQFOXVLRQ RUDOO\ RI | Q D S D E O H R I F R O O H F W L Q J | L O I R U P D W L R Q R I W K H S H U L S K H U D O | L O I R U P D W L R Q R I W K H S H U L S K H U D O |
| L | H[FKDQJLQJ RSLQLRQV | Q D S D E O H R I F R O O H F W L Q J | L O I R U P D W L R Q R I W K H S H U L S K H U D O | L O I R U P D W L R Q R I W K H S H U L S K H U D O |
| O | WKDW VWXGLHV VFLHQW | Q D S D E O H R I F R O O H F W L Q J | L O I R U P D W L R Q R I W K H S H U L S K H U D O | L O I R U P D W L R Q R I W K H S H U L S K H U D O |
| L | IRRGV DQG IRRG PDWHU | Q D S D E O H R I F R O O H F W L Q J | L O I R U P D W L R Q R I W K H S H U L S K H U D O | L O I R U P D W L R Q R I W K H S H U L S K H U D O |
| W | | Q D S D E O H R I F R O O H F W L Q J | L O I R U P D W L R Q R I W K H S H U L S K H U D O | L O I R U P D W L R Q R I W K H S H U L S K H U D O |

5ROH RI OLEHUDO DUWV HGXFDWLRQ LQ WKLV SURJUDP

7KH OLEHUDO DUWV HGXFDWLRQ KHQ ODKLX SJHR JUDLRO DL PDQV RWEKXL D SISHM EDWI FKG G GW EBY LURIT X, MU SGM RORSK H
 VWXGLQJ DXWRQRPRXVO\ DQG D H FLEHCOVWL FV RQFRHOCHFM Q B B DEOXH G RQLUW WKLJW G DWR Z EVKWH DOWR G EDWJ W
 (QJOLVK \$OVR LW HQKDQFHV LQWIKH W VIVHQ WL DEOR DQ SHUKIS HEFV NVHFRDIE L L S K B Q S P F Z O F H O G I H M K I S T Q L Q X L
 FLWLJHQ RI WKH ZRUOG ,W HQD EDOR V QWIKJGDQWHV IWRGD RTJXLD G GWK W WDEHDO WK XOV HN Q B ZI B GSUHR E O WPH P R O W K L D Q
 XVLQJ D WRSGRZQ SHUVSHFWLYH EDVHG RQ WKLV LQWHJUDWHG NQRZOHGJH

\$ W W D F K P H Q

& X U U L F X O X P P D S I R U) R R G 6 F L H Q F H 3 U R J U D P

| | | | | |
|--|---|---------------------|---------------------|-----------------------|
| 6W X G \ D F K L H Y H P H Q W 6 W X G \ D F K L H Y H P H Q W | V W \ H D U | Q G \ H D U | U G \ H D U | W K \ H D U |
| (Y D O X D W L R Q L W H R W V H P H V W H U | Q G V H P H V W H U | U G V H P H V W H U | W K V H P H V W H U | W K K V H P H V W H U |
| 6 H P L Q D U I R U | W K L F V R I 6 F L H Q F H D Q G | | | |
| D > i ? ? ? ? ? % > i ? ? ? ? > i ? ? ? ? | G H Y H O R S L O J 7 H F K Q R O R J \ | | | |
| ?? ? ? ? ? > U ? ? ? ? ? ? ? ? ? ? ? ? ? ? | % Q W H O D L J H O F H | | | |
| ?? ? ? ? # ? ? ? ? ? > i > i ? ! ? ? ? ? ? | , Q W U R G X F W L R Q W R | | | |
| ?? ? ? ! ? ? ? ? ? > i ? ? ? ? > i ? ? ? ? | 8 O L Y H U V L W \ (G X F D W L R Q | | | |
| ?? ? ? ? > i ? > i ? ? ? ? ? > i ? ? ? ? | 5 i ? ? ? ? > i ? ? ? ? ? > i ? ? ? ? | | | |
| ?? ? ? ? ? ? ? ? ? ? ? > i ? ? ? ? > i ? ? | 3 H D F H ? 6 F L H Q F H | | | |
| ?? ? ? ? ? ? ? ? ? ? ? & ? ? > i ? ? ? ? ? > | J & R X U E V H V | | | |
| \$ U H D & R X U E V V X E M H F W V | | | | |

| | | |
|---------------------------------------|---|---------------------------|
| 2 U J D Q L F & K H P L V W U \ | (O Y L U R Q P H Q W D O | |
| E, | 6 F L H Q F H V I R U | 3 X E O L F E + H D O W K |
| & H O O 6 E L H Q E, | % L R S U R E X F W L R Q | |
| | 6 W D W L V W L F V L Q % L R O R J \ | |
| , Q W U R G X F W L R Q W R | | |
| \$ S S O L H G % L R O R J L F D O | | |
| 6 F L H Q F H | | |
| , Q W U R G X F W L R Q W R | \$ J L F X O W X U D O | |
| 0 L F U R E I E R O R J \ | 3 U R G X F W L R Q Q W U R G X F W L R Q W R | |
| 5 H V R X U F H V | 3 K \ V L R O R J \ | |
| 3 K \ V L F V I R U \$ S S O L H G | | |
| % L R O R J L F E O 6 F L H Q F H | | |
| (W K L F V R I 6 F L H Q F H D Q G | | |
| 7 H F K Q R O R J \ | | |
| 6 H P L Q D U L Q) L H O G | | |
| 6 F L H Q F H | | |
| , Q W U R G X F W L R Q W R | | |
| 0 R O H F X O D U | | |
| % L R F K H P L V W U \ | | |
| 5 H V H D U F K) U R Q W R I | | |
| % L R U H V R X U F H 6 F L H Q F H V | | |
| : | | |

D % D V L F N Q R Z O H G J H D Q G
X Q G H U V W D Q Q L Q J U H T X L U H G I R U
D F T X L U L Q J H [S H U W L V H

Q
R
Z
O
H
G

| | | | | | | | | |
|---|--|--|--|--|--|--|--|--|
| D#[[SHUWLVH DQG HWKLFV RI VFLHQFH DQG WHFKQRORJ\] UHJDUGLQJ DQDO\LV DQG HYDOXDWLRQ PHWKRGV IRU VDIHW\ RI IRRG DQG IRRG PDWHULDO | | | | >ÿ?????> i?? ??> i????? >ü????? >ö??> ü????? >ü?????HE >ö??> ñ???? >ö??> ü????? >ü?????HE | >ÿ?????> i?? ??> i????? >ü????? >ö??> ü????? >ü?????HE >ö??> ñ???? >ö??> ü????? >ü?????HE | > ü????? >ÿ????? >ö??> ü????? >ü?????HE >ö??> ñ???? >ö??> ü????? >ü?????HE | | |
| D\$([SHUWLVH UHJDUGLQJ SURGXFWLRQ PDQDJHPHQW DQG GLVWULEXWLRQ RI IRRGV | | | | >ö??> ü????? >ü?????HE >ö??> ü????? >ü?????HE | >ö??> ü????? >ü?????HE >ö??> ü????? >ü?????HE | >ö??> ü????? >ü?????HE >ö??> ü????? >ü?????HE | | |
| D%([SHUWLVH UHJDUGLQJ IRRG SURFHVV LQJ WHFKQRORJLHV DQG GHYHORSHPHQW RI XVHIXO PDWHULDOV | | | | >ö??> ñ????? >ÿ?????> i?? ?????????%> >ö??> ü????? >ü?????HE >ö??> ü????? >ü?????HE | >ö??> ü????? >ü?????HE >ö??> ü????? >ü?????HE >ö??> ü????? >ü?????HE >ö??> ü????? >ü?????HE | >ö??> ü????? >ü?????HE >ö??> ü????? >ü?????HE >ö??> ü????? >ü?????HE >ö??> ü????? >ü?????HE | | |

| | | | | | | | | |
|---|--|--|---|---|--|--|--|--|
| D %DVLF DLWQ FRPPXQLFDWLRQ L SURFHVVVLQJ DQG DFWLYLWLHV UHTX HSHUWLV |)RUHLJQ /DERUDWRU\ QIRUPDWLRQ SIRUPDWLRQ DQG 'DWD LUHG IRU DFTXLULQJ +HDOWK DQG 6ERUWV &RXUVHV | | 6FLHFH &RXUVHV | | | | | |
| | % DVLF /DERUDWRU\ :RUN LQ &KHPLVWU\ | ([SHULPHQWDO 0HWKRGV /DERUDWRU\ %LRORJ)\ , | /DERUDWRU :RUN LQ *HQHUDO %LRORJ)\ , ,,E, /DERUDWRU :RUN LQ *HQHUDO &KHPLVWU\ E, /DERUDWRU :RUN LQ *HQHUDO E3K\VLV | | | | | |
| D!%DVLF WHFKQLTXHV DQG PHWKGRORJLHV IRU KDQGOLQJ IRRGV DQG IRRG PDWHULDOV DELOLW\ WR XQGHUVWDQG YDULRXV SKHQRPHQD UHJDUGLQJ IRRGV IURP VFLHQWLILF SRLQWV RI YLHZ DQG FDSDELOLW\ RI RUJDQLJLQJ WKH VWXG\ UHVXOW LQ D UHSRUW | | | | >ø??????%> >ô??> >ñ????? >ø??????%> >ô??> >ô?%?? >ø??????%> >î????> >î?? >ø????> ????> >ü????!????? >ù????????>ÖE,Ö | >ø??????%> >î????> >î?? >ø????> ????> >ü????!????? >ù????????>ÖE,Ö | >????> ?? >ü????!????? >ù????????>ÖE,Ö | | |

\$ E L O L

| | | | | | | | |
|--|--|--|--|--|---|--|--|
| | | | | | >ö? ? ? ? > ? ? ? ? ? > ? ? ? > >ö? ? ? >ü? ? ? ? ? ? ? ? ? >ÖE,>Ö ? ? ? ? ? ? ? ? > ? ? ? > >ü? ? ? ? ? >ö? ? ? > >ü? ? ? ? ? ? ? ? ? H E•H ? ? ? ? ? ? ? ? > ? ? ? > >ü? ? ? ? ? >ö? ? ? > >ü? ? ? ? ? ? ? ? ? H E•H | | |
| D\$\$E L O L W \ W R U H D G D Q G X Q G H U V W D Q G W H F K Q L F D O H [S O D Q D W L R Q V D Q G E D V L F U H D G L Q J F D S D E L O L W L H V R I V F L H Q W L I L F (Q J O L V K | | | | >p? ? ? ? ? ? > ? ? ? > >ö? ? ? ? ? ? >ø? ? ? ? ? ? ? ! ? ? > ? ? > >ö? ? ? ? >y? ? ? ? ? ? >ÖE,>Ö | | | |
| H D > ? ? ? ? ? ? ? ? % > ? ? ? > ? ? ? ? ? ? ? ? ? Q ? ? ? ? ? ? ? ? ? ? > ? ? ? > ? ? ? ? ? ? ? ? ? ? ? ? V ? ? ? ? ? ? ? ? ? ? > ? ? ? > ? ? ? ? ? ? ? ? & ? ? ? L ? ? ? ? >Ü? ? ? > ? ? # ? > ? ? ? ? > ? ? ? ? ? ? > ? ? ? Y ? ? ? ? ? ? ? ? ? ? >Ø > ? ? ? ? ? ? ? ? ? ? > ? ? ? > ? ? ? ? H ? ? ? ? ? > ? ? ? > ? ? ? > ? ? ? ? ? ? ? ? ? ? >Ø ? ? ? ? ? ? ? ? ? % > ? ? ? ? ? ? ? ? ? > ? ? ? F ? ? ? ? ? ? ! ? ? ? ? > ? ? ? ? ? ? ? % > ? ? ? > ? ? ? > ? D ? ? ? ? ! ? ? ? ? >Ø > ? ? ? > ? ? ? \$? ? ? ? ? ? ? ? S ? ? ? ? ? ? ? ? > ? # ? ? ? > ? ? ? ? ? ? > ? ? ? > ? ? ? ? | | | | >ö? ? ? ? ! ? ? ? ? ? > ? ? > ? ? ? ? ! ? ? ? ? ? > ? ? ? ? ? ! ? ? ? ? ? > ? ? ? ? ? ? > ? ? ? ? ? ? > >ö? ? ? H E,H H E,H H E,H | | | |

HF¹

([D P S O H / L E H U D O D U W V V X E M G S H F W L D O S H H G D O X L M G F W O G D U B D O X D W H G E Q X O N H F W L W Y H E G U H O K E W H G H V X E M H F

Attachment 5

/LVW RI)DFXOW\ 0HPEHUV RI WKH)RRG 6FLHQFH :

| 1DPH R IDFXOV | 1DPH RI SU DQG SRVL | ([WHQV QXPEH | /DERU | ODLO DGGUHV |
|----------------------|------------------------|-----------------|-------|--|
| 6DWRUX | 3URIHVV | | \$ | VX<KURVKLPD X DF MS |
| .L\RVKL . | 3URIHVV | | \$ | NDZ<KURVKLPD X DF MS |
| 7DGDVKL 6KLPDPR | 3URIHVV | | \$ | WDG<KURVKLPD X DF M |
| 7DNX\D 6 | 3URIHVV | | \$ | WDN<KURVKLPD X DF MS |
| 6KLQLFKL 1LVKLPXU | 3URIHVV | | \$ | QVKLQ#KLURVKLPD X DF |
| <RVKLR + | 3URIHVV | | \$ | KDJ<KURVKLPD X DF MS |
| .HQML +R | 3URIHVV | | % | NMKR<KURVKLPD X DF M |
| 1RUL\XNL <DQDND | 3URIHVV | | \$ | \DQDND#KLURVKLPD X DF |
| 7KDQXWF .XPUXQJV | \$VVRFLD 3URIHVV | | \$ | NXPUXQJ#KLURVKLPD X D |
| +DUXKLN .RL]XPL | \$VVRFLD 3URIHVV | | \$ | K NRL]XPL#KLURVKLPD X |
| <RVXNH &KRPHL | \$VVRFLD 3URIHVV | | % | FKRPHL#KLURVKLPD X DF |
| 7DWVX\D 1DND\DP | \$VVRFLD 3URIHVV | | \$ | W QDND\DPD#KLURVKLPD |
| 0DNRWR +LUD\DP | \$VVRFLD 3URIHVV | | \$ | KLUD<KURVKLPD X DF M |
| <RVKLQD <DPDPRW | \$VVLVWD 3URIHVV | | \$ | \DPDPR<KURVKLPD X DF |
| <DNDEH 7DNDIXPL | 9LVLWLQ 3URIHVV | | | &O8/6FLHQFH DQG 7HFK)RRG 'HYHORSPHQW |
| \$NLQREX | 9LVLWLQ 3URIHVV | | | &O8/6FLHQFH DQG 7HFK)RRG 'HYHORSPHQW |
| .DJX\RVK 0DWVXPX | 9LVLWLQ 3URIHVV | | | &O8/6FLHQFH ,QIRUPDWLRQ |

* To call a direct phone number, dial the extension number after "082-424."